



**STORM WATER
POLLUTION
PREVENTION
PLAN
(SWPPP)**



**PRINCE WILLIAM COUNTY
VIRGINIA**

***FOUR SEASONS AT HISTORIC VIRGINIA
PHASE 6, SECTION 1***

DEVELOPMENT

2H6V1001

Project Name

Four Seasons Historic
Phase 6, Sect. 1
Name County, Virginia

Storm Water Pollution Prevention Plan (SWPPP)

In compliance with:

Storm Water Construction General Permit No. DCR 01
Virginia Stormwater Management Program

SWPPP Coordinator:

David F. Richardson
(Signature)

David F. Richardson
(Name of Person)

Land Manager
(Title)

K. Hovnanian Homes of Virginia, Inc.
(Company)

703-878-2774 x 21
(Phone #)

703-675-0940
(Cell Phone #/ Pager #)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

"I certify that the SWPPP coordinator named above is my duly authorized representative for this Project."

Signature:

David F. Richardson (RLD 0093)

Date: 12/17/05

[Authorized Representative per Part III K 1 of the Permit]

Name:

MARK STEVEN

Title:

Vice President

Legal Entity: *Developer*

Storm Water Pollution Prevention Plan
Name County
Project Name

2H6V1002

**Four Season-Historic Virginia,
Phase 6, Section 1
Storm Water Pollution Prevention Plan**

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I. Base Map



Storm Water Pollution Prevention Plan
Fauquier County, VA
Vint Hill (LANDBAY G)

2H6V1003

Erosion & Sediment Control Responsible Land Disturber Certificate

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COMMONWEALTH OF VIRGINIA Soil and Water Conservation Board 203 Governor Street, Suite 206, Richmond, Virginia 23219 Telephone (804) 786-2064		
	EROSION AND SEDIMENT CONTROL RESPONSIBLE LAND DISTURBER	
Expires 12/12/2008	Boyd F Richardson	Certificate Number 23575
<div style="display: flex; justify-content: space-between;"> <div>  <small>Department of Conservation & Recreation Division of Soil & Water Conservation</small> </div> <div style="text-align: right;"> <small>Jack E. Frye Director Division of Soil & Water Conservation</small> </div> </div>		

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I. Introduction

A. SWPPP Purpose

The purpose of this Storm Water Pollution Prevention Plan (SWPPP) is to satisfy the requirement set forth by the Virginia Stormwater Management Program (VSMP) General Permit for Discharges of Storm Water from Construction Activities (DCR01), as defined in 9 VAC 25-180-10 et seq. The purpose of the SWPPP is to:

1. Identify potential sources of pollution, which may reasonably be expected to affect the quality of storm water discharges from the construction site.
2. To describe and ensure the implementation of practices which will be used to reduce pollutants in storm water discharges from the construction site, and to assure compliance with the terms and conditions of the permit.

B. Background- General Permit No. DCR01

The DCR01 is a general permit effective July 1, 2004 with an expiration date of June 30, 2009. The general permit governs storm water discharges from construction activities that cover an area greater than five acres. In order for operators to obtain coverage under this general permit, a Registration Statement (Exhibit B) must be submitted to the Virginia Department of Conservation and Recreation prior to commencement of construction activities.

The DCR01 allows for the discharge of storm water associated with construction activities from the date of coverage until the expiration of the permit.

In order for the operator to terminate coverage under the DCR01 permit, the operator must submit a Notice of Termination (Exhibit B) within 30 days of one of the conditions in Part I G. 1 being met. Authorization for the operator to discharge terminates seven days after the notice of termination is submitted.

II. SWPPP Requirements

A. General Requirements

1. Deadlines

The SWPPP shall be prepared prior to submittal of the registration statement and provide compliance with the terms and schedule of the plan beginning with the initiation of construction activities.

2. Incorporation of Other Plans

The SWPPP requirements are fulfilled by incorporating by reference other plans developed for this construction activity, provided that the incorporated plans meet or

2H6V1004

Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil
Gasoline	Colorless, pale brown or pink petroleum hydrocarbon	Benzene, ethyl benzene, toluene, xylene, MTBE
Diesel fuel	Clear, blue-green to yellow liquid	Petroleum distillate, oil & grease, naphthalene, xylenes
Kerosene	Pale yellow liquid petroleum hydrocarbon	Coal oil, petroleum distillates
Antifreeze/coolant	Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, zinc, lead)
Erosion	Soil particles	Soil, sediment

B. Specific Requirements

1. Site Description

The items required by the Permit regarding site description (Part II D.1., Exhibit A) can be found in the project design plans, which are incorporated by reference into this SWPPP. A summary of the required elements is provided in Table 2, with a reference to the sheet number in the design plans where the required element can be located.

Permit Part II D. 1...	Required Element	Location ¹
a.	Description of construction activity	58
b.	Description of construction sequence of soil disturbing activity	58
c.	Site area estimates, including limits of soil disturbance	58
d.	Pre and post-construction runoff coefficients	59
e.	Existing vegetation at the site	30, 73
f.	Description of other potential pollution sources, including vehicle fueling, chemical storage areas, sanitary waste facilities, construction debris, litter, etc.	N/A
g.	Receiving water names, including the ultimate receiving water, and the areal extent of wetlands	Powell Creek
h.	Site map	53
h.(1)	-Drainage patterns, pre and post-construction	55 thru 58
h.(2)	-Limits of clearing	43 thru 51
h.(3)	-Major structural and non-structural controls	41 thru 438
h.(4)	-Stabilization areas, including types of vegetative cover	55 thru 58
h.(5)	-Surface waters, including wetlands	43

h.(6)	-Storm water discharge points, with an outline of the associated drainage areas	4 ³
h.(7)	-Existing and planned: buildings, paved areas	55 th thru 58
h.(8)	-Permanent storm water management facilities	55
h.(9)	-Offsite material, waste, borrow, or equipment areas covered by the SWPPP	N/A
h.(10)	-Other potential pollution sources (as described in f. above)	N/A
i.	Description of support activities covered by the Permit, including any dedicated concrete and asphalt plants	N/A

[Attach to this SWPPP any required elements that are not found in the design plans]

2. Controls and Measures

The Permit requires the implementation of various types of controls and measures that are implemented to control pollutants in storm water discharges from the project site. The Permit specifically requires the implementation of erosion and sediment control practices (both structural and non-structural), storm water management practices, and specific other controls to reduce pollutants. All E&S and SWM/BMP controls employed in this project were selected to meet and/or exceed State and local requirements and are detailed in the referenced design plans.

Several requirements of the Permit relating to controls (Part II D. 2., Exhibit A) are not included in the referenced design plans. A description of all the required items (including E&S and SWM/BMP) is presented below, along with how they are addressed in this SWPPP:

a. Erosion and Sediment Control

The design plans for this project contain detailed information regarding erosion and sediment controls used in this project. Specifically E&S control measures can be found on Sheets ??-?? of ??.

b. SWM/BMP's

The design plans for this project contain detailed information regarding SWM/BMP controls used in this project. Specifically Stormwater Management Control Measures can be found on Sheet ??-?? of ??.

c. Fuels and Oils

- (i) On-site vehicle refueling will be conducted in a dedicated location away from access to surface waters. Since the location of fueling activities will periodically move during construction, the design plans do not contain a specific location. For each phase of work a location will be determined in the field and noted in the Site Inspection Log (Exhibit B). Containment berms will be located adjacent to the refueling area that will contain any inadvertent spills until they can be cleaned up. Any on-site storage tanks will have a means of secondary containment. In the event of a spill, it will be cleaned up immediately.

and the material, including any contaminated soil, will be disposed of according to all federal, state, and local regulations.

- (ii) All vehicles on site will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage.
- (iii) Petroleum products will be stored in tightly sealed containers, which are clearly labeled.
- (iv) Spill kits will be included with all fueling sources and maintenance activities.
- (v) Any asphalt substances used onsite will be applied according to the manufacturer's recommendation.

d. Solid Waste

No solid materials shall be discharged to surface water. Solid materials, including building materials, garbage, and debris shall be cleaned up daily and deposited into dumpsters, which will be periodically removed from the site and deposited into a landfill.

e. Fertilizer

- (i) Fertilizers will be applied only in the minimum amounts recommended by the manufacturer.
- (ii) Fertilizers will be worked into the soil to limit exposure to storm water.
- (iii) Fertilizers will be stored in a covered shed and partially used bags will be transferred to a sealable bin to avoid spills.

f. Paint and other Chemicals

- (i) All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewers, but will be properly disposed according to the manufacturer's instructions.
- (ii) Spray guns will be cleaned on a removable tarp.
- (iii) Chemicals used on-site are kept in small quantities and stored in closed containers undercover and kept out of direct contact with storm water. As with fuels and oils, any inadvertent spills will be cleaned up immediately and disposed of according to federal, state, and local regulations.

g. Concrete

- (i) Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site, except in a specially designated concrete disposal area.
- (ii) Form release oil used for decorative stonework will be applied over a pallet covered with an absorbent material to collect excess fluid. The absorbent material will be replaced and disposed of properly when saturated.

h. Water Testing

When testing/cleaning of water supply lines, the discharge from the tested pipe will be collected and conveyed to a completed storm water pipe system for ultimate discharge into a sedimentation basin or SWM/BMP facility.

i. Sanitary Waste

Portable lavatories are located on-site and are serviced on a regular basis by a contractor. They will be located in upland areas away from direct contact with surface waters. Any spills occurring during servicing will be cleaned up immediately, including any contaminated soils, and disposed of according to all federal, state, and local regulations.

j. Grading and E&S Activities

A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be maintained and included in Exhibit C of SWPPP.

3. Spills

Oil, chemical or other hazardous substance spills in excess of reportable quantities, in accordance with Part I E. of the Permit (Exhibit A), will be reported to the Department of Conservation and Recreation in accordance with Part III G. of the Permit as soon as the discharge is discovered, but no later than 24 hours. A reportable quantity of oil is defined as a discharge to a surface water that causes a sheen, discoloration, and/or an emulsion. Reports will be made to the following:

Department of Conservation and Recreation
1(804) 786-3998 (Lee Hill)

Virginia Department of Emergency Management
Emergency Operations Center (EOC)
Phone: 1-(800) 468-8892

Materials and equipment necessary for oil or chemical spill cleanup will be kept in the temporary material storage trailer onsite. Equipment will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, saw dust, and plastic and metal trash containers.

SWPPP. Appropriate measures must be taken to ensure that pollution prevention measures for the non-storm water component of the discharge are implemented. The non-storm water discharges associated with this project identified at this time are:

- a. Water line testing.
- b. *[Not used]*

C. Contractor Certification

All contractor's and/or sub-contractors who have responsibility for implementing and maintaining the controls identified in this SWPPP must sign the certification statement contained in Exhibit E. The person signing the certification must meet the signatory requirements, as presented in Part III K of the Permit (Exhibit A). The certifications must be maintained as part of the SWPPP.

2H6V1009

Storm Water Construction General Permit NO. DCR01

STORM WATER
Const. General
Permit
NO. DCR01

2H6V1011



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Northern Virginia Regional Office
13901 Crown Court
Woodbridge, VA 22193-1453
(703) 583-3800 fax (703) 583-3801
www.deq.state.va.us

Robert G. Burnley
Director

Jeffery A. Steers
Regional Director

October 27, 2004

Mr. John S. Snyder
K. Hovnanian at Prince William, LLC
16557 Sparkling Brook Loop
Dumfries, VA 22026

Subject: Construction Storm Water General Permit No. **VAR101439**
Four Seasons at Historic Virginia - Prince William County

Dear Mr. Snyder:

We have received your complete Registration Statement and have determined that this project is eligible for coverage under the VPDES General Permit for Storm Water Discharges from Construction Sites. A copy of this Permit is enclosed. The effective date of the General Permit is July 1, 2004 and the expiration date is June 30, 2009. This project's date of coverage is July 1, 2004. Please read the permit carefully, as you are responsible for meeting all permit conditions.

A Notice of Termination Form has also been enclosed. If at any time you no longer require coverage under the General Permit for Construction Storm Water, you may submit the Termination Form to this office for processing.

Should you have any questions, please feel free to contact Amy Taylor at (703) 583-3852 or by e-mail at agtaylor@deq.virginia.gov.

Respectfully,

A handwritten signature in cursive script, appearing to read "Thomas A. Faha".

Thomas A. Faha
Water Permits Manager

Enclosure: Storm Water Construction General Permit
Termination Form

cc: Prince William County

2H6V1012



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

General Permit No.: **VAR101439**

Effective Date: July 1, 2004
Expiration Date: June 30, 2009

GENERAL PERMIT FOR DISCHARGES OF STORM WATER
FROM CONSTRUCTION ACTIVITIES

AUTHORIZATION TO DISCHARGE UNDER
THE VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM
AND
THE VIRGINIA STATE WATER CONTROL LAW

In compliance with the provisions of the Clean Water Act, as amended, and pursuant to the State Water Control Law and regulations adopted pursuant to that, operators of construction activities (those sites or common plans of development or sale that will result in the disturbance of one or more acres of total land area) with storm water discharges from these construction activities are authorized to discharge to surface waters within the boundaries of the Commonwealth of Virginia, except those specifically named in board regulation or policies which prohibit such discharges.

The authorized discharge shall be in accordance with this cover page, Part I - Discharge Authorization and Special Conditions, Part II - Storm Water Pollution Prevention Plan, and Part III - Conditions Applicable To All VPDES Permits as set forth herein.

2H6V1013

Local Stormwater Management Program Review Checklist

Part I: Administrative Criteria

- ___ A copy of the approved plan and a record of all inspections is maintained for each land development project.
- ___ Evidence of approval of all necessary permits is present.
- ___ All SWM facilities have a maintenance plan/agreement, which identifies the owner and the responsible party for carrying out the maintenance plan.
- ___ SWM program has been integrated with other local programs requiring compliance prior to construction authorization (e.g. erosion & sediment control, Chesapeake Bay, flood insurance, flood plain management, etc.).

Ordinance

- ___ Identify the plan-approving authority and other positions of authority within the program.
- ___ Include the regulations and technical criteria to be used in the program.
- ___ Designate design standards to be used in plan review and inspection (e.g., VSWMH, local manual, etc.).
- ___ Include procedures for the submission and approval of plans.
- ___ Include procedures for the issuance of permits.
- ___ Include procedures for the monitoring and inspection of land development projects.
- ___ Identify the party responsible for conducting inspections and maintenance of permanent stormwater management facilities.

Part II: Technical Criteria

** Denotes components that are required by the Virginia Stormwater Management Law or Regulations

General Criteria**

- ___ Flooding and channel erosion impacts to receiving streams due to land development projects is calculated at each point of discharge from the development project and such includes any runoff from the balance of the watershed, which also contributes to that point of discharge.
- ___ The specified design storms is defined as either:
 - ___ 24-hour storm
 - ___ Storm of critical duration that produces the greatest required storage volume at the site, when using a design method such as the Modified Rational Method.
- ___ For purposes of computing runoff, all pervious lands in the site are assumed prior to development to be in good condition (if the lands are pastures, lawns, or parks), with good cover (if the lands are woods), or with conservation treatment (if the lands are cultivated); regardless of conditions existing at the time of computation.
- ___ Construction of SWM facilities or modifications to channels complies with all applicable laws and regulations.
- ___ Impounding structures that are not covered by the Impounding Structure Regulations (4 VAC 50-20-10 et seq.) are engineered for structural integrity during the 100-year storm event.
- ___ Pre-development and post-development runoff rates are verified by calculations that are consistent with good engineering practices.
- ___ Outflows from SWM facilities are discharged to an adequate channel, and velocity dissipators are placed at the outfall of all SWM facilities and along the length of any outfall channel, as necessary to provide a non-erosive velocity of flow from the basin to a channel.
- ___ SWM criteria are applied to proposed subdivisions as a whole. Hydrologic parameters reflect the ultimate land development and are used in all engineering calculations.
- ___ Construction of SWM impoundment structures within a FEMA designated 100-year floodplain are avoided to the extent possible. When this is unavoidable, all SWM facility construction is in compliance with all applicable regulations under the National Flood Insurance Program.
- ___ Natural channel characteristics are preserved to the maximum extent practicable.
- ___ Land development projects comply with the Virginia Erosion and Sediment Control Law and Regulations.

Water Quality

- ___ Water quality criteria is implemented according to VSWMR 4VAC 3-20-71. Criteria is:
 - ___ Performance-based, or
 - ___ Technology-based

Stream Channel Erosion

- ___ Land development projects comply with Minimum Standard 19 (only requirement for compliance with stream channel component).
- ___ Plan approving authority has the ability to require 24-hour extended detention of the runoff generated by the 1-year, 24-hour storm.
- ___ Is there any other design criteria used for stream channel analysis?

Flooding**

- ___ 10-year post-developed peak rate of runoff from development sites do not exceed the 10-year pre-development peak rate of runoff, or
- ___ Alternate design criteria is adopted, based on geographic, land use, topographic, geologic or other downstream conveyance factors as appropriate.

Regional Stormwater Management Plans

- ___ Regional SWM plan is adopted which addresses:
 - ___ Specific SWM issues within the targeted watersheds
 - ___ Technical criteria, outlined in 4 VAC 3-20-50 through 4 VAC 3-20-85, as needed based on the specific SWM issues.
 - ___ Implications of any local comprehensive plans, zoning requirements and other planning documents
 - ___ Opportunities for financing the watershed plan
 - ___ Maintenance of the regional SWM facilities
 - ___ Future expansion of the selected SWM facilities, in the event that development exceeds the anticipated level



Department of Conservation & Recreation

CONSERVING OREGON'S NATURAL & RECREATIONAL RESOURCES

INSTRUCTIONS for FORM DCR 199-147

VSMP General Permit Notice Of Termination - Construction Activity Storm Water Discharges

General

A VSMP General Permit Notice of Termination must be submitted when an operator no longer wishes to be covered under a VSMP General Permit for Storm Water Discharges From Construction Activities.

Section 1 Activity Operator Information

Give the legal name of the person, firm, public organization, or any other entity that was issued the general permit for the site described in this Notice of Termination. Do not use a colloquial name. Enter the complete address and phone number of the operator.

Section 2 Activity Location Information

Enter the activity's official name and complete street address, including city, state and ZIP code. If the activity or site lacks a street address, indicate the latitude and longitude to the nearest 15 seconds of the approximate center of the site.

Section 3 Permit Information

Enter the existing VSMP Storm Water General Permit number assigned to the activity or site identified in Section 1.

Section 4 Reason for Termination

Check the appropriate statement indicating the reason for submitting this Notice of Termination. The Notice of Termination may only be submitted after one or more of the following conditions have been met:

1. Final stabilization has been achieved on all portions of the site for which the operator is responsible;
2. Another operator has assumed control over all areas of the site that have not been finally stabilized;
3. Coverage under an alternative VPDES or VSMP permit has been obtained; or
4. For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

The Notice of Termination must be submitted within 30 days of one of the above conditions being met.

Authorization to discharge terminates seven (7) days after the Notice of Termination is submitted. For the purposes of this permit, a Notice of Termination that is mailed is considered to be submitted once it is postmarked.

Section 5 Certification

State statutes provide for severe penalties for submitting false information on this Notice of Termination.

State regulations require this Notice of Termination to be signed as follows:

For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (1) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; **[Note: if the title of the individual signing this form is "Plant Manager", submit a written verification that the authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures];**

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

The Department of Conservation and Recreation reserves the right to request additional information not directly addressed by the registration statement if, in its discretion, a facility or operation poses a potential impact on water quality.

VSMP General Permit Registration Statement-Construction Activity Discharges Checklist

Operator

Project Name

Has a copy of the <u>completed</u> registration application been enclosed?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Has the application been signed by a person authorized by the operator?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Has a list of Off-Site Activities been attached?	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Has a list of the Permanent BMPs been attached?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Has a map detailing the site location been attached?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Has a copy of the check and application fee form application been attached to the application?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>

The Registration Application should be collectively mailed to:

Department of Conservation and Recreation
Storm Water Permitting
203 Governor Street, Suite 206
Richmond, VA 23219

****DO NOT ENCLOSE THE ACTUAL FEE PAYMENT WITH APPLICATION**

For registrations where payment will be by check or money order

Has an application fee form been completed?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Has a check or money order been cut for the proper amount?	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Has the check or money order been made payable to "Treasurer of Virginia"	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>

The Actual Payment and Application Fee Form must be sent to:

Department of Conservation and Recreation
Division of Finance, Accounts Payable
ATTN: Storm Water Permits
203 Governor Street
Richmond, Virginia 23219

****DO NOT ENCLOSE THE ACTUAL PERMIT APPLICATION WITH PAYMENT**

Upon receipt of a completed application for registration and payment, DCR will mail a notice of coverage to the Operator listed in the application. Failure to submit all required information will result in the failure of the project to be properly registered and could result in enforcement action.

2H6V1018

General Permit No.: DCR01
Effective Date: July 1, 2004
Expiration Date: June 30, 2009

GENERAL PERMIT FOR DISCHARGES OF STORMWATER FROM
CONSTRUCTION ACTIVITIES
AUTHORIZATION TO DISCHARGE UNDER THE VIRGINIA STORMWATER
MANAGEMENT PROGRAM AND THE VIRGINIA STORMWATER
MANAGEMENT ACT

In compliance with the provisions of the Clean Water Act, as amended, and pursuant to the Virginia Stormwater Management Act and regulations adopted pursuant to that, operators of construction activities (those sites or common plans of development or sale that will result in the disturbance of one or more acres of total land area) with stormwater discharges from these construction activities are authorized to discharge to surface waters within the boundaries of the Commonwealth of Virginia, except those specifically named in State Water Control Board and Virginia Soil and Water Conservation Board regulations and policies or permit issuing authority policies and ordinances which prohibit such discharges.

The authorized discharge shall be in accordance with this cover page, Section I - Discharge Authorization and Special Conditions, Section II - Stormwater Pollution Prevention Plan, and Section III - Conditions Applicable To All VSMP Permits as set forth herein.

SECTION I
DISCHARGE AUTHORIZATION AND SPECIAL CONDITIONS

A. Coverage under this permit.

1. During the period beginning with the date of coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge stormwater from construction activities.
2. This permit also authorizes stormwater discharges from off-site support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that:
 - a. The support activity is directly related to a construction site that is required to have VSMP permit coverage for discharges of stormwater associated with construction activity;
 - b. The support activity is not a commercial operation serving multiple unrelated construction projects by different operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and

2H6V1019

c. Appropriate controls and pollution prevention measures for the discharges from the support activity areas are identified in the stormwater pollution prevention plan required for the construction activity under Section II D of this permit.

3. There shall be no discharge of floating solids or visible foam in other than trace amounts.

B. Limitation on coverage.

1. Post-construction discharges. This permit does not authorize stormwater discharges that originate from the site after construction activities have been completed and the site, including any temporary support activity site, has undergone final stabilization. Post-construction industrial stormwater discharges may need to be covered by a separate VPDES permit.

2. Discharges mixed with nonstormwater. This permit does not authorize discharges that are mixed with sources of nonstormwater, other than those discharges which are identified in Section I D 2 (Exceptions to prohibition of nonstormwater discharges) and are in compliance with Section II D 5 (Nonstormwater discharge management).

3. Discharges covered by another permit. This permit does not authorize stormwater discharges associated with construction activity that have been covered under an individual permit or required to obtain coverage under an alternative general permit in accordance with Part Section III X.

4. TMDL limitation. Discharges to waters for which a "total maximum daily load" (TMDL) allocation for sediment or a parameter that addresses sediment (such as total suspended solids, turbidity, or siltation) has been established by the State Water Control Board and approved by EPA are not eligible for coverage under this permit unless the stormwater pollution prevention plan (SWPPP) developed by the operator incorporates measures and controls that are consistent with the assumptions and requirements of such TMDL. To be eligible for coverage under this general permit, the SWPPP must incorporate any conditions applicable to discharges from the construction site that are necessary for consistency with the assumptions and requirements of the TMDL. If a specific wasteload allocation has been established that would apply to discharges from the construction site, the operator must incorporate that allocation into the SWPPP and implement necessary steps to meet that allocation.

C. Commingled discharges. Any discharge authorized by a different VSMP or VPDES permit may be commingled with discharges authorized by this permit.

D. Prohibition of nonstormwater discharges.

1. Except as provided in Sections I A 2, I C and I D 2, all discharges covered by this permit shall be composed entirely of stormwater associated with construction activity.

2. The following nonstormwater discharges from active construction sites are authorized by this permit provided the nonstormwater component of the discharge is in compliance with Section II D 5 (Nonstormwater discharges):

- a. Discharges from fire fighting activities;
- b. Fire hydrant flushings;
- c. Waters used to wash vehicles where detergents are not used;
- d. Water used to control dust;
- e. Potable water sources, including waterline flushings;
- f. Water used for hydrostatic testing of new pipeline construction;
- g. Routine external building wash down which does not use detergents;
- h. Pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
- i. Uncontaminated air conditioning or compressor condensate;
- j. Uncontaminated ground water or spring water;
- k. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
- l. Uncontaminated excavation dewatering, and
- m. Landscape irrigation.

E. Releases of hazardous substances or oil in excess of reportable quantities.

The discharge of hazardous substances or oil in the stormwater discharges from the construction site shall be prevented or minimized in accordance with the stormwater pollution prevention plan for the site. This permit does not relieve the permittee of the reporting requirements of 40 CFR Part 110 (2002), 40 CFR Part 117 (2002) and 40 CFR Part 302 (2002) or § 62.1-44.34:19 of the Code of Virginia.

Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110 (2002), 40 CFR Part 117 (2002) or 40 CFR Part 302 (2002) occurs during a 24-hour period:

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1. The permittee is required to notify the Department of Environmental Quality and the permit issuing authority in accordance with the requirements of Section III G as soon as he has knowledge of the discharge;
2. Where a release enters a municipal separate storm sewer system (MS4), the permittee shall also notify the owner of the MS4 and the Department of Conservation and Recreation; and
3. The stormwater pollution prevention plan required under Section II D of this permit must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the plan must be modified where appropriate.

F. Spills.

This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill.

G. Termination of permit coverage.

1. The operator of the construction activity may only submit a notice of termination after one or more of the following conditions have been met:
 - a. Final stabilization has been achieved on all portions of the site for which the operator is responsible;
 - b. Another operator has assumed control over all areas of the site that have not been finally stabilized;
 - c. Coverage under an alternative VPDES or VSMP permit has been obtained; or
 - d. For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.
2. The notice of termination must be submitted within 30 days of one of the conditions in Section I G 1 being met. Authorization to discharge terminates seven days after the notice of termination is submitted.
3. The notice of termination shall be signed in accordance with Section III K of this permit.

H. Water quality protection. The permittee must select, install, implement and maintain best management practices (BMPs) at the construction site that minimize pollutants in the discharge as necessary to meet applicable water quality standards. If there is evidence indicating that the stormwater discharges authorized by this permit are causing, have the reasonable potential to cause, or are contributing to an excursion above an applicable water quality standard, or are causing downstream pollution (as defined in this part), the permit issuing authority may take appropriate enforcement action, may require the

permittee to include and implement appropriate controls in the SWPPP to correct the problem, and/or may require the permittee to obtain an individual permit in accordance with 4VAC50-60-410 B 3.

SECTION II STORMWATER POLLUTION PREVENTION PLAN

A stormwater pollution prevention plan (SWPPP) shall be developed and implemented for the construction activity covered by this permit. SWPPPs shall be prepared in accordance with good engineering practices. The SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges from the construction site. In addition, the SWPPP shall describe and ensure the implementation of practices which will be used to reduce pollutants in stormwater discharges from the construction site, and to assure compliance with the terms and conditions of this permit.

The SWPPP requirements of this general permit may be fulfilled by incorporating by reference other state, tribal or local plans such as an erosion and sediment control (ESC) plan, a spill prevention control and countermeasure (SPCC) plan developed for the site under § 311 of the federal Clean Water Act or best management practices (BMP) programs otherwise required for the facility provided that the incorporated plan meets or exceeds the SWPPP requirements of Section II D. If an erosion and sediment control plan for the construction activity is being incorporated by reference, the referenced plan must be approved by the locality in which the construction activity is to occur or by another appropriate plan approving authority authorized under the Erosion and Sediment Control Regulations (4 VAC 50-30) prior to the commencement of construction. All plans incorporated by reference into the SWPPP become enforceable under this permit. If a plan incorporated by reference does not contain all of the required elements of the SWPPP of Section II D, the permittee must develop the missing elements and include them in the required SWPPP.

Once a definable area has been finally stabilized, the operator may mark this on the SWPPP and no further SWPPP or inspection requirements apply to that portion of the site (e.g., earth disturbing activities around one of three buildings in a complex are done and the area is finally stabilized; one mile of a roadway or pipeline project is done and finally stabilized, etc.).

The operator must implement the SWPPP as written from commencement of construction activity until final stabilization is complete.

A. Deadlines for SWPPP preparation and compliance.

1. The SWPPP shall be prepared prior to submittal of the registration statement and provide for compliance with the terms and schedule of the plan beginning with the initiation of construction activities.

2. For ongoing construction activity involving a change of operator, the new operator shall accept and maintain the existing SWPPP, or prepare and implement a new SWPPP prior to taking over operations at the site.

B. Signature, plan review and making plans available.

1. The SWPPP shall be signed in accordance with Section III K.

2. The SWPPP shall be retained, along with a copy of this permit at the construction site from the date of commencement of construction activity to the date of final stabilization. Permittees with day-to-day operation control over SWPPP implementation shall have a copy of the plan available at a central location on-site for the use of all operators and those identified as having responsibilities under the plan whenever they are on the construction site. The SWPPP must be made available, in its entirety, to the department and the permitting issuing authority for review at the time of an on-site inspection.

3. The permittee shall make SWPPPs available upon request to the department; the permit issuing authority; a state or local agency approving erosion and sediment plans, grading plans, or stormwater management plans; local government officials; or the operator of a municipal separate storm sewer system receiving discharges from the site.

C. Maintaining an updated SWPPP.

1. The permittee shall amend the SWPPP whenever there is a change in design, construction, operation, or maintenance that has a significant effect on the discharge of pollutants to surface waters and that has not been previously addressed in the SWPPP.

2. The SWPPP must be amended if during inspections or investigations by site staff, or by local, state or federal officials, it is determined that the discharges are causing water quality exceedances, or the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the construction site.

3. Based on the results of an inspection, the SWPPP must be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP must be completed within seven calendar days following the inspection. Implementation of these additional or modified BMPs must be accomplished as described in Section II D 3 b.

4. The SWPPP must clearly identify for each measure identified in the plan, the contractor(s) or subcontractor(s) that will implement the measure. The SWPPP shall be amended to identify any new contractor that will implement a measure of the plan.

D. Stormwater pollution prevention plan contents.

The SWPPP shall include the following items:

1. Site and activity description. Each SWPPP shall provide the following information:

- a. A description of the nature of the construction activity, including the function of the project (e.g., low density residential, shopping mall, highway, etc.);
- b. The intended sequence and timing of activities that disturb soils at the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation).
- c. Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities including off-site borrow and fill areas;
- d. A description of any other potential pollution sources, such as vehicle fueling, storage of fertilizers or chemicals, sanitary waste facilities, etc.
- e. Identification of the nearest receiving waters at or near the construction site that will receive discharges from disturbed areas of the project;
- f. The location and description on any discharge associated with industrial activity other than construction at the site. This includes stormwater discharges from dedicated asphalt plants and dedicated concrete plants that are covered by this permit.
- g. A site map indicating:
 - (1) Directions of stormwater flow and approximate slopes anticipated after major grading activities;
 - (2) Areas of soil disturbance and areas of the site which will not be disturbed;
 - (3) Locations of major structural and nonstructural controls identified in the SWPPP, including those that will be permanent controls that will remain after construction activities have been completed;
 - (4) Locations where stabilization practices are expected to occur;
 - (5) Surface water bodies (including wetlands);
 - (6) Locations where stormwater discharges to a surface water;
 - (7) Locations of off-site material, waste, borrow or equipment storage areas covered by the plan;
 - (8) Locations of other potential pollution sources , such as vehicle fueling, storage of chemicals, sanitary waste facilities, etc.; and
 - (9) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

2. Controls to reduce pollutants. The SWPPP shall include a description of all pollution control measures that will be implemented as part of the construction activity to control pollutants in stormwater discharges. For each major activity identified in the project description, the SWPPP shall clearly describe appropriate control measures, the general sequencing during the construction process in which the measures will be implemented, and which operator is responsible for the control measure's implementation.

a. Erosion and sediment controls.

(1) Stabilization practices. The SWPPP shall include a description of interim and permanent stabilization practices for the site. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include, but are not limited to: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, riprap, gabions, facines, biologs and other appropriate measures. Use of impervious surfaces for stabilization should be avoided.

(a) A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be maintained and included in the SWPPP.

(b) Except as provided in Section II D 2 a (1) (c), (d) and (e), stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than seven days after the construction activity in that portion of the site has temporarily or permanently ceased.

(c) Where the initiation of stabilization measures by the seventh day after construction activity temporary or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

(d) Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 30 days, temporary stabilization measures do not have to be initiated on that portion of the site.

(e) In drought-stricken areas where initiating perennial vegetative stabilization measures is not possible within seven days after construction activity has temporarily or permanently ceased, final vegetative stabilization measures shall be initiated as soon as practicable.

(2) Structural practices. The SWPPP shall include a description of structural practices to divert flows from exposed soils, retain/detain flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Such practices may include, but are not limited to: silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent

sediment basins. Structural practices should be located on upland soils to the degree attainable. The department and the permit issuing authority encourages the use of a combination of erosion and sediment control measures in order to achieve maximum pollutant removal.

(a) Sediment basins: For common drainage locations that serve an area with three or more acres disturbed at one time, a temporary (or permanent) sediment basin providing 3,618 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,618 cubic feet of storage area per acre drained does not apply to flows from off-site areas and flows from on-site areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. In determining whether installing a sediment basin is attainable, the permittee may consider factors such as site soils, slope, available area on site, etc. In any event, the permittee must consider public safety, especially as it relates to children, as a design factor for the sediment basin and alternative sediment controls shall be used where site limitations would preclude a safe design.

(b) For drainage locations which serve three or more acres at one time and where a temporary sediment basin or equivalent controls is not attainable, smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries, and for those side slope boundaries deemed appropriate as dictated by individual site conditions.

(c) For drainage locations serving less than three acres, smaller sediment basins or sediment traps or both should be used. At a minimum, silt fences, vegetative buffer strips or equivalent sediment controls are required for all downslope boundaries, and for those side slope boundaries deemed appropriate as dictated by individual site conditions, of the construction area unless a sediment basin providing storage for 3,618 cubic feet of storage per acre drained is provided.

b. Management practices.

(1) All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately, or incorrectly, the permittee must replace or modify the control for site situations as soon as practicable.

(2) If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts.

(3) Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source in stormwater discharges.

c. Stormwater management.

(1) The SWPPP shall include a description of, and all necessary calculations supporting, all post-construction stormwater management measures that will be installed during the construction process to control pollutants in stormwater discharges after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. Such measures must be designed and installed in accordance with applicable local and/or state requirements.

(2) Such measures may include, but are not limited to: stormwater detention structures (including dry ponds); stormwater retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff on-site; stormwater wetlands; sand filters; bioretention systems; water quality structures; and sequential systems (which combine several practices). The SWPPP shall include an explanation of the technical basis used to select the practices to control pollution and flows that exceed predevelopment levels.

(3) Outflows from a stormwater management facility or stormwater conveyance system shall be discharged to an adequate channel. In addition, the natural, physical, chemical, and biological characteristics and functions of the receiving waters must be maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water).

d. Other controls.

(1) The SWPPP shall describe measures to prevent the discharge of solid materials, including building materials, garbage, and debris to surface waters of the state, except as authorized by a Clean Water Act § 404 permit.

(2) Where construction vehicle access routes intersect paved public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface. Where sediment is transported onto a public road surface, the road shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner.

(3) The SWPPP shall ensure and demonstrate compliance with applicable state or local waste disposal, sanitary sewer or septic system regulations.

(4) The SWPPP shall include a description of construction and waste materials expected to be stored on-site with updates as appropriate. The plan shall also include a description of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and for spill prevention and response.

(5) The SWPPP shall include a description of pollutant sources from areas other than construction (including stormwater discharges from dedicated asphalt plants and

dedicated concrete plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.

e. Applicable state or local programs.

The SWPPP shall be consistent with all applicable state or local requirements for erosion and sediment control and stormwater management including updates to the SWPPP as necessary to reflect any revisions to applicable state or local requirements for erosion and sediment control and stormwater management.

3. Maintenance of controls.

a. The SWPPP must include a description and schedule of procedures to maintain in good and effective operating conditions vegetation, erosion and sediment control measures and other protective measures during construction identified in the site plan. If site inspections required by Section II D 4 identify BMPs that are not operating effectively, maintenance shall be performed before the next anticipated storm event, or as soon as practicable to maintain the continued effectiveness of stormwater controls.

b. If existing BMPs need to be modified or if additional BMPs are necessary for any reason, implementation shall be completed before the next anticipated storm event. If implementation before the next anticipated storm event is impracticable, the situation shall be documented in the SWPPP and alternative BMPs shall be implemented as soon as practicable.

4. Inspections. Inspections by qualified personnel must be conducted of all areas of the site disturbed by construction activity, and areas used for storage of materials that are exposed to stormwater. "Qualified personnel" means a licensed professional engineer, responsible land disturber (RLD), or other knowledgeable person who (i) holds a certificate of competence from the board in the area of project inspection; or (ii) is enrolled in the board's training program for project inspection or combined administrator and successfully completes such program within one year of enrollment.

a. Inspections shall be conducted at least once every 14 calendar days and within 48 hours of the end of any runoff producing storm event. Where areas have been finally or temporarily stabilized or runoff is unlikely due to winter conditions (e.g., the site is covered with snow or ice, or frozen ground exists) such inspections shall be conducted at least once every month.

b. Inspectors must look for evidence of, or the potential for, pollutants entering the stormwater conveyance system. Erosion and sediment control measures identified in the SWPPP shall be observed to ensure proper operation. Discharge locations where accessible shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

c. Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may limit the access of inspection personnel to the areas described in Section II D 4 b. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls must be inspected on the same frequencies as other construction projects, but representative inspections may be performed. For representative inspections, personnel must inspect controls along the construction site for 0.25 miles above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. The conditions of the controls along each inspected 0.25-mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25-mile segment to either the end of the next 0.25-mile segment, or to the end of the project, whichever occurs first. Inspection locations must be listed in the report required by Section II D 4 e.

d. Based on the results of the inspection, the site and activity description identified in the plan in accordance with Section II D 1 of this permit and pollution prevention measures identified in the SWPPP in accordance with Section II D 2 of this permit shall be revised as appropriate within seven calendar days following the inspection.

e. A report summarizing the scope of the inspection, names and qualifications of personnel making the inspection, the dates of the inspection, major observations relating to the implementation of the SWPPP, and actions taken in accordance with Section II D 4 d of the permit shall be made and retained as part of the SWPPP in accordance with Section III B of this permit. Major observations should include:

- (1) The location(s) of discharges of sediment or other pollutants from the site;
- (2) Location(s) of BMPs that need to be maintained;
- (3) Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
- (4) Location(s) where additional BMPs are needed that did not exist at the time of inspection; and
- (5) Corrective action required including any changes to the SWPPP that are necessary and implementation dates.

The reports shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the stormwater pollution prevention plan and this permit. The report shall be signed in accordance with Section III K of this permit.

5. Nonstormwater discharge management. The SWPPP shall identify all allowable sources of nonstormwater discharges listed in Section I D 2 of this permit that are combined with stormwater discharges from the construction activity at the site, except for flows from fire fighting activities. The SWPPP shall identify and ensure the implementation of appropriate pollution prevention measures for the nonstormwater components of the discharge.

SECTION III CONDITIONS APPLICABLE TO ALL VSMP PERMITS

NOTE: Monitoring is not required for this permit. If you choose to monitor your stormwater discharges or BMPs, you must comply with the requirements of subsections A, B, and C, as appropriate.

A. Monitoring.

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitoring activity.
2. Monitoring shall be conducted according to procedures approved under 40 CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency, unless other procedures have been specified in this permit.
3. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements.

B. Records.

1. Records of monitoring information shall include:
 - a. The date, exact place, and time of sampling or measurements;
 - b. The individual(s) who performed the sampling or measurements;
 - c. The date(s) and time(s) analyses were performed;
 - d. The individual(s) who performed the analyses;
 - e. The analytical techniques or methods used; and
 - f. The results of such analyses.
2. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of

all data used to complete the registration statement for this permit, for a period of at least three years from the date of the sample, measurement, report or request for coverage. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the board.

C. Reporting monitoring results.

1. The permittee shall submit the results of the monitoring required by this permit not later than the 10th day of the month after monitoring takes place, unless another reporting schedule is specified elsewhere in this permit. Monitoring results shall be submitted to the permit issuing authority.
2. Monitoring results shall be reported on a discharge monitoring report (DMR) or on forms provided, approved or specified by the department.
3. If the permittee monitors any pollutant specifically addressed by this permit more frequently than required by this permit using test procedures approved under 40 CFR Part 136 or using other test procedures approved by the U.S. Environmental Protection Agency or using procedures specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the department.
4. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

D. Duty to provide information. The permittee shall furnish to the permit issuing authority, within a reasonable time, any information which the permit issuing authority may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permit issuing authority may require the permittee to furnish, upon request, such plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from his discharge on the quality of state waters, or such other information as may be necessary to accomplish the purposes of the Virginia Stormwater Management Act . The permittee shall also furnish to the permit issuing authority, upon request, copies of records required to be kept by this permit.

E. Compliance schedule reports. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Unauthorized discharges. Except in compliance with this permit or another permit issued by the permit issuing authority or the Department of Environmental Quality, it shall be unlawful for any person to:

1. Discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances; or

2. Otherwise alter the physical, chemical or biological properties of such state waters and make them detrimental to the public health, or to animal or aquatic life, or to the use of such waters for domestic or industrial consumption, or for recreation, or for other uses.

G. Reports of unauthorized discharges. Any permittee who discharges or causes or allows a discharge of sewage, industrial waste, other wastes or any noxious or deleterious substance into or upon state waters in violation of Section III F, or who discharges or causes or allows a discharge that may reasonably be expected to enter state waters in violation of Section III F, shall notify the department, the Department of Environmental Quality, and the permit issuing authority of the discharge immediately upon discovery of the discharge, but in no case later than 24 hours after said discovery. A written report of the unauthorized discharge shall be submitted to the department, the Department of Environmental Quality, and the permit issuing authority within five days of discovery of the discharge. The written report shall contain:

1. A description of the nature and location of the discharge;
2. The cause of the discharge;
3. The date on which the discharge occurred;
4. The length of time that the discharge continued;
5. The volume of the discharge;
6. If the discharge is continuing, how long it is expected to continue;
7. If the discharge is continuing, what the expected total volume of the discharge will be; and
8. Any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by this permit.

Discharges reportable to the department, the Department of Environmental Quality, and the permit issuing authority under the immediate reporting requirements of other regulations are exempted from this requirement.

H. Reports of unusual or extraordinary discharges. If any unusual or extraordinary discharge including a bypass or upset should occur from a facility and the discharge enters or could be expected to enter state waters, the permittee shall promptly notify, in no case later than 24 hours, the department, the Department of Environmental Quality, and the permit issuing authority by telephone after the discovery of the discharge. This notification shall provide all available details of the incident, including any adverse

effects on aquatic life and the known number of fish killed. The permittee shall reduce the report to writing and shall submit it to the department, the Department of Environmental Quality, and the permit issuing authority within five days of discovery of the discharge in accordance with Part Section III I 2. Unusual and extraordinary discharges include but are not limited to any discharge resulting from:

1. Unusual spillage of materials resulting directly or indirectly from processing operations;
2. Breakdown of processing or accessory equipment;
3. Failure or taking out of service some or all of the facilities; and
4. Flooding or other acts of nature.

I. Reports of noncompliance. The permittee shall report any noncompliance which may adversely affect state waters or may endanger public health.

1. An oral report shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which shall be reported within 24 hours under this paragraph:

- a. Any unanticipated bypass; and
- b. Any upset which causes a discharge to surface waters.

2. A written report shall be submitted within five days and shall contain:

- a. A description of the noncompliance and its cause;
- b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
- c. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The permit issuing authority may waive the written report on a case-by-case basis for reports of noncompliance under Section III I if the oral report has been received within 24 hours and no adverse impact on state waters has been reported.

3. The permittee shall report all instances of noncompliance not reported under Section III I 1 or 2 in writing at the time the next monitoring reports are submitted. The reports shall contain the information listed in Section III I 2.

NOTE: The immediate (within 24 hours) reports required in Section III G, H and I may be made to the department's Urban Program's Section of the Division of Soil and Water Conservation. Reports may be made by telephone or by fax. For reports outside normal

working hours, leaving a recorded message shall fulfill the immediate reporting requirement. For emergencies, the Virginia Department of Emergency Management maintains a 24 hour telephone service at 1-800-468-8892.

4. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the department, it shall promptly submit such facts or information.

J. Notice of planned changes.

1. The permittee shall give notice to the permit issuing authority as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

a. The permittee plans an alteration or addition to any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:

(1) After promulgation of standards of performance under § 306 of the federal Clean Water Act which are applicable to such source; or

(2) After proposal of standards of performance in accordance with § 306 of the Clean Water Act which are applicable to such source, but only if the standards are promulgated in accordance with § 306 within 120 days of their proposal;

b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are not subject to effluent limitations in this permit; or

2. The permittee shall give advance notice to the permit issuing authority of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

K. Signatory requirements.

1. Registration statement. All registration statements shall be signed as follows:

a. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy-making or decision-making functions for the corporation; or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations;

the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

c. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a public agency includes: (i) the chief executive officer of the agency or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

2. Reports, etc. All reports required by permits and other information requested by the board shall be signed by a person described in Section III K 1 or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Section III K 1;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

c. The written authorization is submitted to the department.

3. Changes to authorization. If an authorization under Section III K 2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Section III K 2 shall be submitted to the permit issuing authority prior to or together with any reports or information to be signed by an authorized representative.

4. Certification. Any person signing a document under Section III K 1 or 2 shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

L. Duty to comply. The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Virginia Stormwater Management Act and the Clean Water Act, except that noncompliance with certain provisions of this permit may constitute a violation of the Virginia Stormwater Management Act but not the Clean Water Act. Permit noncompliance is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

The permittee shall comply with effluent standards or prohibitions established under § 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

M. Duty to reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall submit a new registration statement at least 90 days before the expiration date of the existing permit, unless permission for a later date has been granted by the board. The board shall not grant permission for registration statements to be submitted later than the expiration date of the existing permit.

N. Effect of a permit. This permit does not convey any property rights in either real or personal property or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, or any infringement of federal, state or local law or regulations.

O. State law. Nothing in this permit shall be construed to preclude the institution of any legal action under, or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any other state law or regulation or under authority preserved by § 510 of the Clean Water Act. Except as provided in permit conditions on "bypassing" (Section III U), and "upset" (Section III V) nothing in this permit shall be construed to relieve the permittee from civil and criminal penalties for noncompliance.

P. Oil and hazardous substance liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under §§ 62.1-44.34:14 through 62.1-44.34:23 of the State Water Control Law.

Q. Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective plant performance, adequate funding, adequate staffing, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are

installed by the permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

R. Disposal of solids or sludges. Solids, sludges or other pollutants removed in the course of treatment or management of pollutants shall be disposed of in a manner so as to prevent any pollutant from such materials from entering state waters.

S. Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

T. Need to halt or reduce activity not a defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

U. Bypass.

1. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to ensure efficient operation. These bypasses are not subject to the provisions of Section III U 2 and 3.

2. Notice.

a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, prior notice shall be submitted, if possible at least 10 days before the date of the bypass.

b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section III I.

3. Prohibition of bypass.

a. Bypass is prohibited, and the permit issuing authority may take enforcement action against a permittee for bypass unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required under Section III U 2.

b. The permit issuing authority may approve an anticipated bypass, after considering its adverse effects, if the permit issuing authority determines that it will meet the three conditions listed in Section III U 3 a.

V. Upset.

1. An upset constitutes an affirmative defense to an action brought for noncompliance with technology-based permit effluent limitations if the requirements of Section III V 2 are met. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.

2. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

a. An upset occurred and that the permittee can identify the cause(s) of the upset;

b. The permitted facility was at the time being properly operated;

c. The permittee submitted notice of the upset as required in Section III I; and

d. The permittee complied with any remedial measures required under Section III S.

3. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

W. Inspection and entry. The permittee shall allow the director as the Board's designee, or an authorized representative (including an authorized contractor acting as a representative of the administrator), upon presentation of credentials and other documents as may be required by law to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

4. Sample or monitor at reasonable times, for the purposes of ensuring permit compliance or as otherwise authorized by the Clean Water Act and the Virginia Stormwater Management Act, any substances or parameters at any location.

For purposes of this section, the time for inspection shall be deemed reasonable during regular business hours, and whenever the facility is discharging. Nothing contained herein shall make an inspection unreasonable during an emergency.

X. Permit actions. Permits may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Y. Transfer of permits.

1. Permits are not transferable to any person except after notice to the permit issuing authority. Except as provided in Section III Y 2, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued, or a minor modification made, to identify the new permittee and incorporate such other requirements as may be necessary under the Virginia Stormwater Management Act and the Clean Water Act.

2. As an alternative to transfers under Section III Y 1, this permit may be automatically transferred to a new permittee if:

a. The current permittee notifies the permit issuing authority at least 30 days in advance of the proposed transfer of the title to the facility or property;

b. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

c. The permit issuing authority does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Section III Y 2 b.

Z. Severability. The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

PART I DISCHARGE AUTHORIZATION AND SPECIAL CONDITIONS

A. Coverage under this permit.

1. During the period beginning with the date of coverage under this general permit and lasting until the permit's expiration date, the permittee is authorized to discharge storm water from construction activities.
2. This permit also authorizes storm water discharges from off-site support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that:
 - a. The support activity is directly related to a construction site that is required to have VPDES permit coverage for discharges of storm water associated with construction activity;
 - b. The support activity is not a commercial operation serving multiple unrelated construction projects by different operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and
 - c. Appropriate controls and pollution prevention measures for the discharges from the support activity areas are identified in the storm water pollution prevention plan required for the construction activity under Part II D of this permit.
3. There shall be no discharge of floating solids or visible foam in other than trace amounts.

B. Limitation on coverage.

1. Post-construction discharges. This permit does not authorize storm water discharges that originate from the site after construction activities have been completed and the site, including any temporary support activity site, has undergone final stabilization. Post-construction industrial storm water discharges may need to be covered by a separate VPDES permit.
2. Discharges mixed with nonstorm water. This permit does not authorize discharges that are mixed with sources of nonstorm water, other than those discharges which are identified in Part I D 2 (Exceptions to prohibition of nonstorm water discharges) and are in compliance with Part II D 5 (Nonstorm water discharge management).
3. Discharges covered by another permit. This permit does not authorize storm water discharges associated with construction activity that have been covered under an individual permit or required to obtain coverage under an alternative general permit in accordance with Part III X.
4. TMDL limitation. Discharges to waters for which a "total maximum daily load" (TMDL) allocation for sediment or a parameter that addresses sediment (such as total suspended solids, turbidity, or siltation) has been established by the board and approved by EPA are not eligible for coverage under this permit unless the storm water pollution prevention plan (SWPPP) developed by the operator incorporates measures and controls that are consistent with the assumptions and requirements of such TMDL. To be eligible for coverage under this general permit, the SWPPP must incorporate any conditions applicable to discharges from the construction site that are necessary for consistency with the assumptions and requirements of the TMDL. If a specific wasteload allocation has been established that would apply to discharges from the construction site, the operator must incorporate that allocation into the SWPPP and implement necessary steps to meet that allocation.

3. The storm water pollution prevention plan required under Part II D of this permit must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the plan must be modified where appropriate.

F. Spills.

This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill.

G. Termination of permit coverage.

1. The operator of the construction activity may only submit a notice of termination after one or more of the following conditions have been met:
 - a. Final stabilization has been achieved on all portions of the site for which the operator is responsible;
 - b. Another operator has assumed control over all areas of the site that have not been finally stabilized;
 - c. Coverage under an alternative VPDES permit has been obtained; or
 - d. For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.
2. The notice of termination must be submitted within 30 days of one of the conditions in Part I G 1 being met. Authorization to discharge terminates seven days after the notice of termination is submitted.
3. The notice of termination shall be signed in accordance with Part III K of this permit.

- H. Water quality protection. The permittee must select, install, implement and maintain best management practices (BMPs) at the construction site that minimize pollutants in the discharge as necessary to meet applicable water quality standards. If there is evidence indicating that the storm water discharges authorized by this permit are causing, have the reasonable potential to cause, or are contributing to an excursion above an applicable water quality standard, or are causing downstream pollution (as defined in § 62.1-44.3 of the Code of Virginia), the board may take appropriate enforcement action, may require the permittee to include and implement appropriate controls in the SWPPP to correct the problem, and/or may require the permittee to obtain an individual permit in accordance with 9 VAC 25-31-170 B 3.

PART II
STORM WATER POLLUTION PREVENTION PLAN

A storm water pollution prevention plan (SWPPP) shall be developed and implemented for the construction activity covered by this permit. SWPPPs shall be prepared in accordance with good engineering practices. The SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site. In addition, the SWPPP shall describe and ensure the implementation of practices which will be used to reduce pollutants in storm water discharges from the construction site, and to assure compliance with the terms and conditions of this permit.

The SWPPP requirements of this general permit may be fulfilled by incorporating by reference other state, tribal or local plans such as an erosion and sediment control (ESC) plan, a spill prevention control and countermeasure (SPCC) plan developed for the site under § 311 of the federal Clean Water Act or best management practices (BMP) programs otherwise required for the facility provided that the incorporated plan meets or exceeds the SWPPP requirements of Part II D. If an erosion and sediment control plan for the construction activity is being incorporated by reference, the referenced plan must be approved by the locality in which the construction activity is to occur or by another appropriate plan approving authority authorized under the Erosion and Sediment Control Regulations (4 VAC 50-30) prior to the commencement of construction. All plans incorporated by reference into the SWPPP become enforceable under this permit. If a plan incorporated by reference does not contain all of the required elements of the SWPPP of Part II D, the permittee must develop the missing elements and include them in the required SWPPP.

Once a definable area has been finally stabilized, the operator may mark this on the SWPPP and no further SWPPP or inspection requirements apply to that portion of the site (e.g., earth disturbing activities around one of three buildings in a complex are done and the area is finally stabilized; one mile of a roadway or pipeline project is done and finally stabilized, etc.).

The operator must implement the SWPPP as written from commencement of construction activity until final stabilization is complete.

A. Deadlines for SWPPP preparation and compliance.

1. The SWPPP shall be prepared prior to submittal of the registration statement and provide for compliance with the terms and schedule of the plan beginning with the initiation of construction activities.
2. For ongoing construction activity involving a change of operator, the new operator shall accept and maintain the existing SWPPP, or prepare and implement a new SWPPP prior to taking over operations at the site.

B. Signature, plan review and making plans available.

1. The SWPPP shall be signed in accordance with Part III K.
2. The SWPPP shall be retained, along with a copy of this permit at the construction site from the date of commencement of construction activity to the date of final stabilization. Permittees with day-to-day operation control over SWPPP implementation shall have a copy of the plan available at a central location on-site for the use of all operators and those identified as having

- (1) Directions of storm water flow and approximate slopes anticipated after major grading activities;
 - (2) Areas of soil disturbance and areas of the site which will not be disturbed;
 - (3) Locations of major structural and nonstructural controls identified in the SWPPP, including those that will be permanent controls that will remain after construction activities have been completed;
 - (4) Locations where stabilization practices are expected to occur;
 - (5) Surface water bodies (including wetlands);
 - (6) Locations where storm water discharges to a surface water;
 - (7) Locations of off-site material, waste, borrow or equipment storage areas covered by the plan;
 - (8) Locations of other potential pollution sources , such as vehicle fueling, storage of chemicals, sanitary waste facilities, etc.; and
 - (9) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.
2. Controls to reduce pollutants. The SWPPP shall include a description of all pollution control measures that will be implemented as part of the construction activity to control pollutants in storm water discharges. For each major activity identified in the project description, the SWPPP shall clearly describe appropriate control measures, the general sequencing during the construction process in which the measures will be implemented, and which operator is responsible for the control measure's implementation.
- a. Erosion and sediment controls.
- (1) Stabilization practices. The SWPPP shall include a description of interim and permanent stabilization practices for the site. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include, but are not limited to: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, riprap, gabions, facines, biologs and other appropriate measures. Use of impervious surfaces for stabilization should be avoided.
 - (a) A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be maintained and included in the SWPPP.
 - (b) Except as provided in Part II D 2 a (1) (c), (d) and (e), stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than seven days after the construction activity in that portion of the site has temporarily or permanently ceased.
 - (c) Where the initiation of stabilization measures by the seventh day after construction activity temporary or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

or other information indicates a control has been used inappropriately, or incorrectly, the permittee must replace or modify the control for site situations as soon as practicable.

- (2) If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts.
- (3) Litter, construction debris, and construction chemicals exposed to storm water shall be prevented from becoming a pollutant source in storm water discharges.

c. Storm water management.

- (1) The SWPPP shall include a description of all post-construction storm water management measures that will be installed during the construction process to control pollutants in storm water discharges after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. Such measures must be designed and installed in accordance with applicable local and/or state requirements.
- (2) Such measures may include, but are not limited to: storm water detention structures (including dry ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff on-site; storm water wetlands; sand filters; bioretention systems; water quality structures; and sequential systems (which combine several practices). The SWPPP shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.
- (3) Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide a nonerosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water).

d. Other controls.

- (1) The SWPPP shall describe measures to prevent the discharge of solid materials, including building materials, garbage, and debris to surface waters of the state, except as authorized by a Clean Water Act § 404 permit.
- (2) Where construction vehicle access routes intersect paved public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface. Where sediment is transported onto a public road surface, the road shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner.
- (3) The SWPPP shall ensure and demonstrate compliance with applicable state or local waste disposal, sanitary sewer or septic system regulations.
- (4) The SWPPP shall include a description of construction and waste materials expected to be stored on-site with updates as appropriate. The plan shall also include a description of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to storm water, and for spill prevention and response.

- c. Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may limit the access of inspection personnel to the areas described in Part II D 4 b. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls must be inspected on the same frequencies as other construction projects, but representative inspections may be performed. For representative inspections, personnel must inspect controls along the construction site for 0.25 miles above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. The conditions of the controls along each inspected 0.25-mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25-mile segment to either the end of the next 0.25-mile segment, or to the end of the project, whichever occurs first. Inspection locations must be listed in the report required by Part II D 4 e.
- d. Based on the results of the inspection, the site and activity description identified in the plan in accordance with Part II D 1 of this permit and pollution prevention measures identified in the SWPPP in accordance with Part II D 2 of this permit shall be revised as appropriate within seven calendar days following the inspection.
- e. A report summarizing the scope of the inspection, names and qualifications of personnel making the inspection, the dates of the inspection, major observations relating to the implementation of the SWPPP, and actions taken in accordance with Part II D 4 d of the permit shall be made and retained as part of the SWPPP in accordance with Part III B of this permit. Major observations should include:
 - (1) The location(s) of discharges of sediment or other pollutants from the site;
 - (2) Location(s) of BMPs that need to be maintained;
 - (3) Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
 - (4) Location(s) where additional BMPs are needed that did not exist at the time of inspection; and
 - (5) Corrective action required including any changes to the SWPPP that are necessary and implementation dates.

The reports shall identify any incidents of noncompliance. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the storm water pollution prevention plan and this permit. The report shall be signed in accordance with Part III K of this permit.

- 5. Nonstorm water discharge management. The SWPPP shall identify all allowable sources of nonstorm water discharges listed in Part I D 2 of this permit that are combined with storm water discharges from the construction activity at the site, except for flows from fire fighting activities. The SWPPP shall identify and ensure the implementation of appropriate pollution prevention measures for the nonstorm water components of the discharge.

PART III
CONDITIONS APPLICABLE TO ALL VPDES PERMITS

NOTE: Monitoring is not required for this permit. If you choose to monitor your storm water discharges or BMPs, you must comply with the requirements of subsections A, B, and C, as appropriate.

A. Monitoring.

1. Samples and measurements taken as required by this permit shall be representative of the monitored activity.
2. Monitoring shall be conducted according to procedures approved under 40 CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency, unless other procedures have been specified in this permit.
3. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements.

B. Records.

1. Records of monitoring information shall include:
 - a. The date, exact place, and time of sampling or measurements;
 - b. The individual(s) who performed the sampling or measurements;
 - c. The date(s) and time(s) analyses were performed;
 - d. The individual(s) who performed the analyses;
 - e. The analytical techniques or methods used; and
 - f. The results of such analyses.
2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years, the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the registration statement for this permit, for a period of at least three years from the date of the sample, measurement, report or request for coverage. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the board.

C. Reporting monitoring results.

1. The permittee shall submit the results of the monitoring required by this permit not later than the 10th day of the month after monitoring takes place, unless another reporting schedule is specified elsewhere in this permit. Monitoring results shall be submitted to the department's regional office.
2. Monitoring results shall be reported on a discharge monitoring report (DMR) or on forms provided, approved or specified by the department.

8. Any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by this permit.

Discharges reportable to the department under the immediate reporting requirements of other regulations are exempted from this requirement.

H. Reports of unusual or extraordinary discharges. If any unusual or extraordinary discharge including a bypass or upset should occur from a treatment works and the discharge enters or could be expected to enter state waters, the permittee shall promptly notify, in no case later than 24 hours, the department by telephone after the discovery of the discharge. This notification shall provide all available details of the incident, including any adverse effects on aquatic life and the known number of fish killed. The permittee shall reduce the report to writing and shall submit it to the department within five days of discovery of the discharge in accordance with Part III I 2. Unusual and extraordinary discharges include but are not limited to any discharge resulting from:

1. Unusual spillage of materials resulting directly or indirectly from processing operations;
2. Breakdown of processing or accessory equipment;
3. Failure or taking out of service some or all of the treatment works; and
4. Flooding or other acts of nature.

I. Reports of noncompliance. The permittee shall report any noncompliance which may adversely affect state waters or may endanger public health.

1. An oral report shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which shall be reported within 24 hours under this paragraph:

- a. Any unanticipated bypass; and
- b. Any upset which causes a discharge to surface waters.

2. A written report shall be submitted within five days and shall contain:

- a. A description of the noncompliance and its cause;
- b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
- c. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The board may waive the written report on a case-by-case basis for reports of noncompliance under Part III I if the oral report has been received within 24 hours and no adverse impact on state waters has been reported.

3. The permittee shall report all instances of noncompliance not reported under Part III I 1 or 2 in writing at the time the next monitoring reports are submitted. The reports shall contain the information listed in Part III I 2.

NOTE: The immediate (within 24 hours) reports required in Part III G, H and I may be made to the department's regional office. Reports may be made by telephone or by fax. For reports outside normal working hours, leaving a recorded message shall fulfill the immediate reporting requirement. For emergencies, the Virginia Department of Emergency Management maintains a 24 hour telephone service at 1-800-468-8892.

officer having responsibility for the overall operations of a principal geographic unit of the agency.

2. Reports, etc. All reports required by permits and other information requested by the board shall be signed by a person described in Part III K 1 or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - a. The authorization is made in writing by a person described in Part III K 1;
 - b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or any individual occupying a named position; and
 - c. The written authorization is submitted to the department.
3. Changes to authorization. If an authorization under Part III K 2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part III K 2 shall be submitted to the department prior to or together with any reports or information to be signed by an authorized representative.
4. Certification. Any person signing a document under Part III K 1 or 2 shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

- L. Duty to comply. The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the State Water Control Law and the Clean Water Act, except that noncompliance with certain provisions of this permit may constitute a violation of the State Water Control Law but not the Clean Water Act. Permit noncompliance is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

The permittee shall comply with effluent standards or prohibitions established under § 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under § 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

- M. Duty to reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall submit a new registration statement at least 90 days before the expiration date of the existing permit, unless permission for a later date has been granted by the board. The board shall not grant permission for registration statements to be submitted later than the expiration date of the existing permit.

a. Bypass is prohibited, and the board may take enforcement action against a permittee for bypass unless:

- (1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- (3) The permittee submitted notices as required under Part III U 2.

b. The board may approve an anticipated bypass, after considering its adverse effects, if the board determines that it will meet the three conditions listed in Part III U 3 a.

V. Upset.

1. An upset constitutes an affirmative defense to an action brought for noncompliance with technology-based permit effluent limitations if the requirements of Part III V 2 are met. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.
2. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:
 - a. An upset occurred and that the permittee can identify the cause(s) of the upset;
 - b. The permitted facility was at the time being properly operated;
 - c. The permittee submitted notice of the upset as required in Part III I; and
 - d. The permittee complied with any remedial measures required under Part III S.
3. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

W. Inspection and entry. The permittee shall allow the director, or an authorized representative, upon presentation of credentials and other documents as may be required by law to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purposes of ensuring permit compliance or as otherwise authorized by the Clean Water Act and the State Water Control Law, any substances or parameters at any location.

Four Seasons in Historic Virginia – Phase 6, Section 1

Storm Water Pollution Prevention Plan

SITE DESCRIPTION

Project Name and Location: Four Seasons in Historic Virginia – Phase 6, Section 1
16403 Dumfries Road

Developer Name and Address: Mr. John Snyder
16559 Sparkling Brook Loop
Dumfries, Virginia 22026

Description:

The Four Seasons project is located in the northwest quadrant of Interstate Route 95 and State Route 234 interchange, above the town of Dumfries and below the community of Montclair. This site is mostly a wooded area with poplar, oak, and beech with some pine as the predominate tree type.

The area site is located in the northwestern portion of the Four Seasons in the Historic Virginia Development. Two sections of this property will be developed in future phases (PWC Plan# 00-00206). The site area is bounded by existing Four Seasons Phase 5 - Section 2 (PWC Plan# 03-00397) to the northeast, and Phase 5 – Section 1 (PWC Plan# 03-00275) to the southeast, and existing Four Seasons Phase 1 – Section 2 (PWC Plan# 00-00464) to the south.

This plan consists of 107 lots. Development of this parcel will consist of construction of all the necessary roads, curb and gutter, storm, sanitary and storm sewers needed to support this subdivision section.

Soils within the site area are:

Dumfries Sandy Loam
Lunt Loam
Comus Loam
Hatboro Silt Loam
Quantico Sandy Loam

Soil disturbing activities will include: clearing and grading; installing a temporary construction entrance, perimeter and other erosion and sediment controls; grading; excavation for the sediment trap and basin, storm sewer, sanitary force main, utilities, building underground level and foundations; construction of curb and gutter, road and preparation for final seeding.

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Runoff Coefficient: The pre-developed coefficient of runoff is $c = 0.30$
The final coefficient of runoff for the site will be $c = 0.55$

Site Area: The site is approximately 32.00 HA (79.09 acres) of which 21.03 HA (51.99 acres) will be disturbed by construction activities.

Wetland Area: Onsite has a wetland area of 0.02 HA (0.06 acres). The wetland area that will be disturbed by construction activities onsite is 0.01 HA (0.03 acres).

SEQUENCE OF MAJOR ACTIVITIES

The order of activities will be as follows:

1. A pre-construction meeting shall be held with county inspectors, the contractor, and engineer, prior to the start of construction of this section.
2. Install the temporary construction entrance with a wash rack and sediment – trapping device.
3. Clear and grub for perimeter controls and install tree protection as depicted on plan.
4. Install silt fence.
5. Install sediment traps and sediment basins to include storm pipes necessary for drainage. All sediment traps and basins shall remain in place for the duration of the Phase II construction. If necessary, these controls shall be reshaped as the site is graded in order to maintain optimal erosion control.
6. Install diversion dikes to divert water to sediment trap and sediment basins.
7. Seed/Mulch berm of sediment traps and basins, and dike within 48 hours after installed.
8. Clear and grub the remainder of the site and install the rest of the Phase I erosion controls as depicted on the plan.
9. Pile topsoil.
10. Stabilize denuded areas and stockpiles not to remain longer than 14 days.
11. Rough grade the detention ponds. The ponds will be constructed in the initial phase of construction, but will not be used as a sediment control device until storm sewer systems are installed. Once the storm sewer systems are installed the detention ponds shall be utilized as a sediment control device. Construct the retaining walls as necessary for grading. Rough grade the remainder of the site. The contractor will take the necessary measures to control dust as per Virginia Erosion and Sediment Control Handbook Standard 3.39.
12. Install utilities, storm sewer, sanitary sewer, and curb and gutter.
13. After storm run T3-T5 is installed and as SWM road is rough graded, remove sediment basin #3 and temporary HDPE at silt basin #3.

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14. Apply stone to the road.
15. Reshape sediment traps and basins until grading and seeding is complete.
16. Install inlet protection, which will entrap sediment before it enters undisturbed areas or existing and/or proposed storm sewer systems.
17. Complete grading and seeding.
18. When all construction activity is complete and the site is stabilized, remove inlet protection, diversion dike, and silt fence; and reseed any areas disturbed by their removal. These measures shall be maintained through construction activities and through all phases of grading until upstream stabilization is possible for final grading. Structural measures are to be retained until upland areas are stabilized.

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Name of Receiving Waters: The entire site will drain to Powell's Creek.

CONTROLS

Erosion and Sediment Controls

Stabilization Practices

Temporary Stabilization - Top soils stock piles and disturbed portions of the site where construction activities temporarily cease for at least 14 days will be stabilized with temporary seed and mulch no later than 7 days from the last construction activity in that area. The temporary seed, lime, fertilizer, and mulch shall be applied in accordance with the Virginia Erosion and Sediment Control Handbook. Areas of the site which are to be paved will be temporarily stabilized in accordance with the Virginia Erosion and Sediment Control Handbook, until bituminous pavement can be applied.

Permanent Stabilization - Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 7 days after final grade is reached on any portion of the site. The permanent seed mix shall be selected according to the current seasonal conditions. Seeding and selection of the seed mixture shall be in accordance with the Virginia Erosion and Sediment Control Handbook Standard and Specification 3.32. After seeding, each area shall be mulched with straw. The straw mulch is to be tacked into place by a disk with blades set nearly straight. The golf course superintendent shall approve all seed mixtures prior to application.

Any slopes that are 3:1 or greater and slopes at a height greater than six feet may require additional stabilization measures including, but not limited to geotextile matting, slope drains, sodding or pegging. These measures will be installed as deemed necessary by the site inspector and job superintendent.

Structural Practices

Tree Protection - Will be constructed at tree save areas and at limits of construction to ensure the survival of desirable trees where they will be effective for erosion and sediment control, watershed protection, landscape beautification, dust and pollution control, noise reduction, shade and other environmental benefits while the land is being converted from forest to urban type uses. Tree save areas shall be clearly marked in the field by orange safety fence.

Temporary Silt Fence - Will be constructed onsite to intercept and detain small amounts of sediment from disturbed areas during construction in order to prevent sediment from leaving the site. They will be installed as shown and around lots during Phase I and II construction, in accordance with standard 3.05 of the VESHB, 1992 edition.

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Super Silt Fence – Super silt fence will be installed as shown during Phase 1 and 2 construction.

Temporary Earth Dike - Will be constructed to collect runoff from the disturbed area and direct the runoff to the sediment traps and basins. They will be installed along the periphery of the site as depicted on the Phase I and II Erosion Control Plan, in accordance with standard 3.09 of the VESHB, 1992 edition.

Sediment Traps - Will be constructed at various locations on the site (See Phase I and II Erosion Control Plan) and formed by constructing an embankment and excavating a storage pond. The trap will drain through an-outlet pipe. The sediment should be removed from the trap when the volume of the wet storage is reduced by one-half.

Construction Entrance – A construction entrance in accordance with standard 3.02 of the VESHB, 1992 edition, will be placed at the entrance of the site and equipped with wash rack; wash water will be supplied by a public water source or by water truck.

Storm Inlet Protection – Inlet protection will be placed on curb inlets as soon as they are brought to grade. Inlet protection for drop inlets will be provided in accordance with standard 3.07 of the VESHB, 1992 edition.

Sediment Basin - Will be constructed at three locations on the site (See Phase 1 Erosion Control Plan). The proposed sediment basins shall be installed with the Phase 1 perimeter controls and removed after the site is rough graded and the storm sewer down stream is constructed.

Inlet Protection - Will be installed to prevent sediment from entering storm drainage system prior to permanent stabilization of the disturbed area.

Outlet Protection -Will be installed at existing storm structures to prevent scour at storm water outlets, to protect the outlet structures, and to minimize the potential for downstream erosion by reducing the velocity and energy of concentrated storm water flows.

Check Dams – Will be constructed in the existing onsite drainage swale to reduce the velocity of concentrated storm water flows, thereby reducing erosion of the drainage swale.

Temporary Seeding – Areas not worked for a period more than 7 days shall be seeded. Hydroseeded areas shall be checked after seeding to ensure appropriate coverage has been obtained.

Geotextile Matting – Due to the severity of the slopes, we recommend placement of geotextile matting or jute mesh on the fill slopes of the site. Placement shall be coordinated with the county site inspector and the site superintendent.

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Culvert Inlet Protection – Inlet protection for DI-7 grate inlets that receive more than 1 acre of drainage shall be provided in accordance with Culvert Inlet Protection, standard 3.08 of the VESHB, 1992 edition.

Culvert Outlet Protection – Outlet protection for ES-1 and EW-1 outlets shall be provided in accordance with Outlet Protection, standard 3.18 of the VESHB, 1992 edition.

Gravel Outlet Weirs – Gravel outlet weirs will be installed as shown during Phase 1 construction and are sized in accordance with standard 3.13 of the VESHB, 1992 edition.

Rock Check Dams – Rock Check Dams will be installed as shown during Phase 1 construction in accordance with standard 3.20 of the VESHB, 1992 edition.

Post-Construction Storm Water Management

SWM and BMPS are being provided for 175 acres of the Four Seasons project. Two SWM/BMP ponds will be built with this section. The post-development area draining to the facility is 143.9 acres, which includes areas from future sections.

The SWM pond is designed with a combined spillway riser structure, with a 60-inch outlet pipe, which will adequately route the 100-year storm in accordance with the DCSM. The use of a combined spillway for the pond outfall is justified by the lack of a location for an emergency spillway due to the fact that the dam is also a road embankment. The existing storm drainage system can adequately handle the two-year flow without eroding, the ten-year flow stays within the system, overland relief has been provided onsite and the 100-year storm does not flood any structures. The facility will be maintained by the HOA.

WASTE DISPOSAL

WASTE MATERIALS

All waste materials will be collected and stored in a securely lidded metal dumpster rented from Northern Virginia Waste Company, which is a licensed solid waste management company in Prince William County. The dumpster will meet all local Prince William County and any State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of once per week or more often if necessary, and the trash will be hauled to the Manassas Transfer, the Lorton Landfill, or the Potomac Landfill. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer, and the individual who manages the day-to-day site operations will be responsible for seeing that these procedures are followed.

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HAZARDOUS WASTE

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and Mr. John Snyder, the individual who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

SANITARY WASTE

All sanitary waste will be collected from the portable units a minimum of one time per week by a licensed sanitary waste management contractor, as required by local regulation. All sanitary sewer or septic systems shall be constructed and maintained in compliance with local and state requirements.

OFF-SITE VEHICLE TRACKING

Two stabilized construction entrances has been provided to help reduce vehicle tracking of sediments. The paved street adjacent to the site entrance will be shoveled or swept daily to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

TIMING OF CONTROLS/MEASURES

As indicated in the Sequence of Major Activities, the earth dike, temporary construction entrances, sediment traps and basins will be installed prior to clearing or grading of any other portions of this site. Areas where construction activities temporarily cease for more than 14 days will be stabilized with a temporary seed and mulch within 7 days of the last disturbance. Once construction activity ceases permanently in an area, that area will be stabilized with permanent seed and mulch. After this site is stabilized, the accumulated sediment will be removed from the trap. The inlet protection will be removed, as well as the silt fence and the earth dike. Any areas disturbed by their removal shall be reseeded.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The storm water pollution prevention plan reflects Prince William County requirements for storm water management and erosion sediment control, as established in State Water Control Board ordinance VR680-14-19. To ensure compliance, this plan was prepared in accordance with the Prince William County Design and Construction Standards Manual and the Virginia Erosion and Sediment Control Handbook. There are no other applicable State or Federal requirements for sediment and erosion site plans (or permits), or storm water management site plans (or permits).

Four Seasons in Historic Virginia – Phase 6, Section 1 Storm Water Pollution Prevention Plan

MAINTENANCE/INSPECTION PROCEDURES Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls;

- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- Built up sediment will be removed from silt fence when it has reached one-half the height of the fence.
- The sediment basin and trap will be inspected for depth of sediment, and built up sediment will be removed when it reaches 50 percent of the design capacity of the wet storage and at the end of the job.
- Gravel outlets will be checked regularly for sediment build-up and drainage blockage. If gravel is clogged by sediment, it shall be removed and cleaned or replaced.
- The land development contractor shall maintain erosion and sediment peripheral controls until the site has been adequately stabilized and released by the site inspector. Erosion control during building is the responsibility of the site builder. Appropriate measures will be shown on the individual lot grading plans.
- Diversion dike will be inspected and any breaches promptly repaired.
- Silt fence will be checked regularly for undermining or deterioration of the filter fabric. Sediment shall be removed when deposition reaches half way to the top of the barrier.
- Seeded areas shall be checked regularly to ensure that a good stand is maintained.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth. Areas should be fertilized and reseeded as deemed necessary by the site inspector.
- The dates of major grading activities when construction ceases temporarily or permanently on a portion of the site, and dates when stabilization measures are initiated will be recorded in the inspection report.
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.

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- Mr. John Snyder, site superintendent, will select three individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.
- Personnel selected for inspection and maintenance responsibilities will receive training from Mr. John Snyder. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.
- If sediment has escaped the construction site, sediment offsite will be removed promptly to minimize offsite impact. This shall be done in accordance with local and state regulations.

Non-Storm Water Discharge

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- Water from water line flushings.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials has occurred).
- Uncontaminated ground water (from dewatering excavation).

All non-storm water discharges will be directed to the sediment trap and basin prior to discharge.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

- Concrete
- Fertilizers
- Detergents
- Petroleum Based Products
- Paints (enamel or latex)
- Cleaning solvents
- Metal studs

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- Wood
 - Steel
 - Masonry Block
 - Tar
 - Insulation Material
-

SPILL PREVENTION

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping:

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used up before disposing of the container.
- Manufacturers' recommendations for proper use and disposal will be followed.
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.
- No construction or equipment is permitted in RPA areas unless specifically shown on the plan for utility work.
- The proposed sediment basin shall be installed with the Phase 1 perimeter controls and removed after the site is rough graded and the storm sewer down stream is constructed.
- Diversion dikes and sediment traps will be in place prior to mass grading operations.

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Hazardous Products:

- These practices are used to reduce the risks associated with hazardous materials.
- Products will be kept in original containers unless they are not resealable.
- Original labels and material safety data will be retained; they contain important product information.
- If surplus product must be disposed of, manufacturers' or local State recommended methods for proper disposal will be followed.

The following product specific practices will be followed onsite:

Petroleum Products:

All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled.

Any asphalt substances used onsite will be applied according to manufacturers' recommendations and state and local regulations.

Fertilizers:

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or State and local regulations.

Concrete Trucks:

Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

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Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and clean-up:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies. This method must meet or exceed state and local regulations.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery in accordance with state and local regulations.
- The spill area will be kept well ventilated and personnel will wear appropriate clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state and local government agency, regardless of size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from occurring and how to clean up the spill if there is another one.
- Mr. John Snyder, the site superintendent, is responsible for the day-to-day site operations. He will be the spill prevention and clean-up coordinator. He will then designate at least three other site personnel who will receive spill prevention and cleanup training, which will at least meet or exceed state and local regulations. These individuals will become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the office trailer in the material area on-site.

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POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all its attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____ Date: _____

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CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the Virginia Pollutant Discharge Elimination System (VPDES) General permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature	For:	Responsible For:
Date:		
Date:		
Date:		

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STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT OF
0.5 INCHES OR MORE

INSPECTOR: _____ DATE: _____

INSPECTOR'S QUALIFICATIONS:

DAYS SINCE LAST RAINFALL: _____ AMOUNT OF LAST RAINFALL _____ INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBED	DATE OF NEXT DISTURBANCE	STABILIZED? (YES/NO)	STABILIZED WITH	CONDITION
ROADS					

STABILIZATION REQUIRED:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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STRUCTURAL CONTROLS

DATE: _____

TREE PROTECTION

AREA	HAS ANY TREE PROTECTION FALLEN DOWN?	IS THERE EVIDENCE OF ROOT DAMAGE?

MAINTENANCE REQUIRED FOR TREE PROTECTION:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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STRUCTURAL CONTROLS

DATE: _____

SILT FENCE

AREA	IS THE SEDIMENT BUILDUP MORE THAN 2 THE HEIGHT OF THE FENCE?	IS THERE EVIDENCE OF WASHOUT OR OVER-TOPPING?

MAINTENANCE REQUIRED FOR SILT FENCE:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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STRUCTURAL CONTROLS

DATE: _____

SUPER SILT FENCE

AREA	IS THE SEDIMENT BUILDUP MORE THAN 2 THE HEIGHT OF THE FENCE?	IS THERE EVIDENCE OF WASHOUT OR OVER-TOPPING?

MAINTENANCE REQUIRED FOR SILT FENCE:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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STRUCTURAL CONTROLS

DATE: _____

EARTH DIKE

FROM	TO	IS DIKE STABILIZED?	IS THERE EVIDENCE OF WASHOUT OR OVER-TOPPING?

MAINTENANCE REQUIRED FOR EARTH DIKE:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROL

DATE: _____

SEDIMENT TRAP

TRAP	IS EMBANKMENT STABILIZED?	DEPTH OF SEDIMENT TRAP	CONDITION OF TRAP SIDE SLOPES	ANY EVIDENCE OF OVER-TOPPING OF THE EMBANKMENT?
#1				
#2				
#3				
#4				
#5				
#6				
#7				
#8				
#9				
#10				
#11				
#12				

MAINTENANCE REQUIRED FOR SEDIMENT TRAP:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

DATE: _____

SEDIMENT BASIN

BASIN	IS EMBANKMENT STABILIZED?	DEPTH OF SEDIMENT BASIN	CONDITION OF BASIN SIDE SLOPES	ANY EVIDENCE OF OVER-TOPPING OF THE EMBANKMENT?
#1				
#2				
#3				

MAINTENANCE REQUIRED FOR SEDIMENT BASIN:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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INSPECTION AND MAINTENANCE FORM**

STRUCTURAL CONTROLS

DATE: _____

STORM DRAIN INLET PROTECTION

INLET PROTECTION	IS IT CAUSING EXCESSIVE PONDING?	DEPTH OF SEDIMENT ACCUMULATION
STORM STRUCTURE # 10		
STORM STRUCTURE # 11		
STORM STRUCTURE # 12		
STORM STRUCTURE # 13		
STORM STRUCTURE # 14		
STORM STRUCTURE # 15		
STORM STRUCTURE # 16		
STORM STRUCTURE # 22		
STORM STRUCTURE # 23		
STORM STRUCTURE # 24		
STORM STRUCTURE # 25		
STORM STRUCTURE # 26		
STORM STRUCTURE # 27		
STORM STRUCTURE # 31		
STORM STRUCTURE # 32		
STORM STRUCTURE # 33		

MAINTENANCE REQUIRED FOR OUTLET PROTECTION:

TO BE PERFORMED BY: _____ **ON OR BEFORE:** _____

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STORM WATER POLLUTION PREVENTION PLAN
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STRUCTURAL CONTROLS

DATE: _____

STORM DRAIN INLET PROTECTION

INLET PROTECTION	IS IT CAUSING EXCESSIVE PONDING?	DEPTH OF SEDIMENT ACCUMULATION
STORM STRUCTURE # 34		
STORM STRUCTURE # 35		
STORM STRUCTURE # 36		
STORM STRUCTURE # 41		
STORM STRUCTURE # 42		
STORM STRUCTURE # 43		
STORM STRUCTURE # 44		
STORM STRUCTURE # 45		
STORM STRUCTURE # 46		
STORM STRUCTURE # 47		
STORM STRUCTURE # 61		
STORM STRUCTURE # 62		
STORM STRUCTURE # 63		
STORM STRUCTURE # 64		
STORM STRUCTURE # 65		

MAINTENANCE REQUIRED FOR OUTLET PROTECTION:

TO BE PERFORMED BY: _____ **ON OR BEFORE:** _____

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**STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE FORM**

STRUCTURAL CONTROLS

DATE: _____

STORM DRAIN INLET PROTECTION

INLET PROTECTION	IS IT CAUSING EXCESSIVE PONDING?	DEPTH OF SEDIMENT ACCUMULATION
STORM STRUCTURE # 66		
STORM STRUCTURE # 67		
STORM STRUCTURE # 68		
STORM STRUCTURE # 70		
STORM STRUCTURE # 71		
STORM STRUCTURE # 72		
STORM STRUCTURE # 73		
STORM STRUCTURE # 74		
STORM STRUCTURE # 75		
STORM STRUCTURE # 76		
STORM STRUCTURE # 76A		
STORM STRUCTURE # 76B		
STORM STRUCTURE # 81		
STORM STRUCTURE # 82		
STORM STRUCTURE # 84		
STORM STRUCTURE # 85		

MAINTENANCE REQUIRED FOR OUTLET PROTECTION:

TO BE PERFORMED BY: _____ **ON OR BEFORE:** _____

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**STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM**

STRUCTURAL CONTROLS

DATE: _____

OUTLET PROTECTION

OUTLET PROTECTION	0% SLOPE ALONG THE LENGTH OF APRON?	OUTFALL AT THE END OF APRON

MAINTENANCE REQUIRED FOR OUTLET PROTECTION:

TO BE PERFORMED BY: _____ **ON OR BEFORE:** _____

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STRUCTURAL CONTROLS

DATE: _____

ROCK CHECK DAM

AREA	IS THE SEDIMENT BUILD-UP MORE THAN 2 THE HEIGHT OF THE CHECK DAM?	IS THERE EVIDENCE OF FLOWS AROUND THE EDGES?

MAINTENANCE REQUIRED FOR ROCK CHECK DAM:

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

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OTHER CONTROLS

DATE: _____

STABILIZED CONSTRUCTION ENTRANCE

DOES MUCH SEDIMENT GET TRACKED ONTO ROAD?	IS THE GRAVEL CLEAN OR IS IT FILLED WITH SEDIMENT?	DOES ALL TRAFFIC USE THE STABILIZED ENTRANCE TO LEAVE THIS SITE?	IS THE CULVERT BENEATH THE ENTRANCE WORKING?

MAINTENANCE REQUIRED FOR STABILIZED CONSTRUCTION ENTRANCE:

TO BE PERFORMED BY: _____ **ON OR BEFORE:** _____

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**STORM WATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM**

CHANGES REQUIRED TO POLLUTION PREVENTION PLAN:

REASONS FOR CHANGES:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE: _____

DATE: _____

Four Seasons in Historic Virginia – Phase 6, Section 1
Storm Water Pollution Prevention Plan

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

PROJECT:

DATE:

SITE DESCRIPTION

____ Project Name and Location (Lat., Long. or Address)
____ Owners Name and Address
____ Description
____ Runoff Coefficient
____ Site Area
____ Sequence of Major Activities
____ Name of Receiving Waters
____ Dedicated Asphalt Plants or Concrete Plants
____ Area of Wetlands

CONTROLS: Erosion and Sediment

____ Stabilization Practices
____ Structural Practices
____ Storm Water Management
____ Waste Disposal:
 ____ Waste Materials
 ____ Hazardous Waste
 ____ Sanitary Waste
____ Offsite Vehicle Tracking
____ Timing of Controls/Measures
____ Certification of Compliance with Federal, States and Local Regulations

MAINTENANCE/INSPECTION PROCEDURES

____ Erosion and Sediment Control Inspection and Maintenance Practices
____ Non-storm Water Discharge
____ Inventory for Pollution Prevention Plan

SPILL PREVENTION

____ Material Management Practices
____ Good Housekeeping
____ Hazardous Products
____ Petroleum Products
____ Fertilizers
____ Paints
____ Concrete Trucks
____ Spill Control Practices
____ Pollution Prevention Plan Certification
____ Contractor's Certification

***INSPECTION AND MAINTENANCE REPORT FORMS**

____ Stabilization Measures
____ Stabilized Construction Entrances (1 form per entrance)
____ Sediment Trap (one form per each phase)
____ Sediment Trap/Basin (one form per each phase)
____ Silt Fence (one form for each phase)
____ Earth Dike (one form per each phase)
____ Rock Check Dam (one form per each phase)
____ Storm Inlet Protection (one form per each phase)
____ Storm Outlet Protection (one form per each phase)
____ Fill Diversion (one form per each phase)
____ Fill Diversion (one form per each phase)
____ Changes Required to Pollution Prevention Plan (one form per each phase)

MISCELLANEOUS

____ The County Siltation & Erosion control Plan and the Storm Water Pollution Prevention Plan are consistent and reflect any revisions to either plan.

COMMONWEALTH of VIRGINIA

Virginia Stormwater Management Regulations 2001

Department of Conservation and Recreation
Division of Soil and Water Conservation
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Phone (804) 786-2064



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

2H6V1080

VIRGINIA STORMWATER MANAGEMENT REGULATIONS

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The following is a complete text of the Virginia Stormwater Management Regulations 4VAC3-20 amended by the Board of Conservation and Recreation, effective March 5, 1998

PART I.
GENERAL.

4 VAC 3-20-10. Definitions.

The following words and terms used in this chapter have the following meanings, unless the context clearly indicates otherwise.

"Act" means Article 1.1 (§ 10.1-603.1 et seq.) of Chapter 6 of Title 10.1 of the Code of Virginia.

"Adequate channel" means a channel that will convey the designated frequency storm event without overtopping the channel banks nor causing erosive damage to the channel bed or banks.

"Applicant" means any person submitting a stormwater management plan for approval.

"Aquatic bench" means a 10- to 15-foot wide bench around the inside perimeter of a permanent pool that ranges in depth from zero to 12 inches. Vegetated with emergent plants, the bench augments pollutant removal, provides habitats, conceals trash and water level fluctuations, and enhances safety.

"Average land cover condition" means a measure of the average amount of impervious surfaces within a watershed, assumed to be 16%. Note that a locality may opt to calculate actual watershed-specific values for the average land cover condition based upon 4 VAC 3-20-101.

"Best management practice (BMP)" means a structural or nonstructural practice which is designed to minimize the impacts of development on surface and groundwater systems.

"Bioretention basin" means a water quality BMP engineered to filter the water quality volume through an engineered planting bed, consisting of a vegetated surface layer (vegetation, mulch, ground cover), planting soil, and sand bed, and into the in-situ material.

"Bioretention filter" means a bioretention basin with the addition of a sand filter collector pipe system beneath the planting bed.

"Board" means the Board of Conservation and Recreation.

"Channel" means a natural or manmade waterway.

"Constructed wetlands" means areas intentionally designed and created to emulate the water quality improvement function of wetlands for the primary purpose of removing pollutants from stormwater.

"Department" means the Department of Conservation and Recreation.

"Development" means a tract of land developed or to be developed as a unit under single ownership

or unified control which is to be used for any business or industrial purpose or is to contain three or more residential dwelling units.

"Director" means the Director of the Department of Conservation and Recreation.

"Flooding" means a volume of water that is too great to be confined within the banks or walls of the stream, water body or conveyance system and that overflows onto adjacent lands, causing or threatening damage.

"Grassed swale" means an earthen conveyance system which is broad and shallow with erosion resistant grasses and check dams, engineered to remove pollutants from stormwater runoff by filtration through grass and infiltration into the soil.

"Impervious cover" means a surface composed of any material that significantly impedes or prevents natural infiltration of water into soil. Impervious surfaces include, but are not limited to, roofs, buildings, streets, parking areas, and any concrete, asphalt, or compacted gravel surface.

"Infiltration facility" means a stormwater management facility which temporarily impounds runoff and discharges it via infiltration through the surrounding soil. While an infiltration facility may also be equipped with an outlet structure to discharge impounded runoff, such discharge is normally reserved for overflow and other emergency conditions. Since an infiltration facility impounds runoff only temporarily, it is normally dry during nonrainfall periods. Infiltration basin, infiltration trench, infiltration dry well, and porous pavement shall be considered infiltration facilities.

"Inspection" means an on-site review of the project's compliance with the approved plan, the local stormwater management program, and any applicable design criteria.

"Land development" or *"land development project"* means a manmade change to, or construction on, the land surface, except as exempted in the Stormwater Management Act, § 10.1-603.8 B of the Code of Virginia, that changes its runoff characteristics.

"Linear development project" means a land development project that is linear in nature such as, but not limited to, (i) the construction of electric and telephone utility lines, and natural gas pipelines; (ii) construction of tracks, rights-of-way, bridges, communication facilities and other related structures of a railroad company; and (iii) highway construction projects.

"Local stormwater management program" or *"local program"* means a statement of the various methods adopted pursuant to the Act and implemented by a locality to manage the runoff from land development projects and shall include an ordinance with provisions to require the control of after-development stormwater runoff rate of flow, the proper maintenance of stormwater management facilities, and minimum administrative procedures consistent with this chapter.

"Locality" means a county, city, or town.

"Nonpoint source pollution" means contaminants such as sediment, nitrogen and phosphorous, hydrocarbons, heavy metals, and toxics whose sources cannot be pinpointed but rather are washed

from the land surface in a diffuse manner by stormwater runoff.

"Nonpoint source pollutant runoff load" or *"pollutant discharge"* means the average amount of a particular pollutant measured in pounds per year, delivered in a diffuse manner by stormwater runoff.

"Percent impervious" means the impervious area within the site divided by the area of the site multiplied by 100.

"Person" means any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, county, city, town or other political subdivision of the Commonwealth, any interstate body or any other legal entity.

"Planning area" means a designated portion of the parcel on which the land development project is located. Planning areas shall be established by delineation on a master plan. Once established, planning areas shall be applied consistently for all future projects.

"Post-development" refers to conditions that reasonably may be expected or anticipated to exist after completion of the land development activity on a specific site or tract of land.

"Pre-development" refers to the conditions that exist at the time that plans for the land development of a tract of land are approved by the plan approval authority. Where phased development or plan approval occurs (preliminary grading, roads and utilities, etc.), the existing conditions at the time *prior to* the first item being approved or permitted shall establish pre-development conditions.

"Regional (watershed-wide) stormwater management facility" or *"regional facility"* means a facility or series of facilities designed to control stormwater runoff from a specific watershed, although only portions of the watershed may experience land development.

"Regional (watershed-wide) stormwater management plan" or *"regional plan"* means a document containing material describing how runoff from open space, existing development and future planned development areas within a watershed will be controlled by coordinated design and implementation of regional stormwater management facilities.

"Runoff" or *"stormwater runoff"* means that portion of precipitation that is discharged across the land surface or through conveyances to one or more waterways.

"Sand filter" means a contained bed of sand which acts to filter the first flush of runoff. The runoff is then collected beneath the sand bed and conveyed to an adequate discharge point or infiltrated into the in-situ soils.

"Shallow marsh" means a zone within a stormwater extended detention basin that exists from the surface of the normal pool to a depth of six to 18 inches, and has a large surface area and, therefore, requires a reliable source of baseflow, groundwater supply, or a sizeable drainage area, to maintain the desired water surface elevations to support emergent vegetation.

"Site" means the parcel of land being developed, or a designated planning area in which the land development project is located.

"State project" means any land development project which is undertaken by any state agency, board, commission, authority or any branch of state government, including state supported institutions of higher learning.

"Stormwater detention basin" or "detention basin" means a stormwater management facility which temporarily impounds runoff and discharges it through a hydraulic outlet structure to a downstream conveyance system. While a certain amount of outflow may also occur via infiltration through the surrounding soil, such amounts are negligible when compared to the outlet structure discharge rates and are, therefore, not considered in the facility's design. Since a detention facility impounds runoff only temporarily, it is normally dry during nonrainfall periods.

"Stormwater extended detention basin" or "extended detention basin" means a stormwater management facility which temporarily impounds runoff and discharges it through a hydraulic outlet structure over a specified period of time to a downstream conveyance system for the purpose of water quality enhancement or stream channel erosion control. While a certain amount of outflow may also occur via infiltration through the surrounding soil, such amounts are negligible when compared to the outlet structure discharge rates and, therefore, are not considered in the facility's design. Since an extended detention basin impounds runoff only temporarily, it is normally dry during nonrainfall periods.

"Stormwater extended detention basin-enhanced" or "extended detention basin-enhanced" means an extended detention basin modified to increase pollutant removal by providing a shallow marsh in the lower stage of the basin.

"Stormwater management facility" means a device that controls stormwater runoff and changes the characteristics of that runoff including, but not limited to, the quantity and quality, the period of release or the velocity of flow.

"Stormwater management plan" or "plan" means a document containing material for describing how existing runoff characteristics will be affected by a land development project and methods for complying with the requirements of the local program or this chapter.

"Stormwater retention basin" or "retention basin" means a stormwater management facility which includes a permanent impoundment, or normal pool of water, for the purpose of enhancing water quality and, therefore, is normally wet, even during nonrainfall periods. Storm runoff inflows may be temporarily stored above this permanent impoundment for the purpose of reducing flooding, or stream channel erosion.

"Stormwater retention basin I" or "retention basin I" means a retention basin with the volume of the permanent pool equal to three times the water quality volume.

"Stormwater retention basin II" or "retention basin II" means a retention basin with the volume of the permanent pool equal to four times the water quality volume.

"Stormwater retention basin III" or "retention basin III" means a retention basin with the volume of the permanent pool equal to four times the water quality volume with the addition of an aquatic bench.

"Subdivision" unless otherwise defined in a local ordinance adopted pursuant to § 15.1-465 of the Code of Virginia, means the division of a parcel of land into three or more lots or parcels of less than five acres each for the purpose of transfer of ownership or building development, or, if a new street is involved in such division, any division of a parcel of land. The term includes resubdivision and, when appropriate to the context, shall relate to the process of subdividing or to the land subdivided.

"Vegetated filter strip" means a densely vegetated section of land engineered to accept runoff as overland sheet flow from upstream development. It shall adopt any natural vegetated form, from grassy meadow to small forest. The vegetative cover facilitates pollutant removal through filtration, sediment deposition, infiltration and absorption, and is dedicated for that purpose.

"Water quality volume" means the volume equal to the first 1/2 inch of runoff multiplied by the impervious surface of the land development project.

"Watershed" means a defined land area drained by a river, stream or drainage ways or system of connecting rivers, streams, or drainage ways such that all surface water within the area flows through a single outlet.

4 VAC 3-20-30. Purposes.

The purposes of this chapter are to provide a framework for the administration, implementation and enforcement of the Act, while at the same time providing flexibility for innovative solutions to stormwater management issues.

4 VAC 3-20-40. Applicability.

This chapter is applicable to:

1. Every locality that establishes a local stormwater management program; and
2. Every state project.

PART II.
TECHNICAL CRITERIA.

4 VAC 3-20-50. Applicability.

This part specifies technical criteria for localities that establish a local stormwater management program and for state projects.

4 VAC 3-20-60. General.

A. Determination of flooding and channel erosion impacts to receiving streams due to land development projects shall be measured at each point of discharge from the development project and such determination shall include any runoff from the balance of the watershed which also contributes to that point of discharge.

B. The specified design storms shall be defined as either a 24-hour storm using the rainfall distribution recommended by the U.S. Soil Conservation Service when using U.S. Soil Conservation Service methods or as the storm of critical duration that produces the greatest required storage volume at the site when using a design method such as the Modified Rational Method.

C. For purposes of computing runoff, all pervious lands in the site shall be assumed prior to development to be in good condition (if the lands are pastures, lawns, or parks), with good cover (if the lands are woods), or with conservation treatment (if the lands are cultivated); regardless of conditions existing at the time of computation.

D. Construction of stormwater management facilities or modifications to channels shall comply with all applicable laws and regulations. Evidence of approval of all necessary permits shall be presented.

E. Impounding structures that are not covered by the Impounding Structure Regulations (4 VAC 50-20-10 et seq.) shall be engineered for structural integrity during the 100-year storm event.

F. Pre-development and post-development runoff rates shall be verified by calculations that are consistent with good engineering practices.

G. Outflows from a stormwater management facility shall be discharged to an adequate channel, and velocity dissipators shall be placed at the outfall of all stormwater management facilities and along the length of any outfall channel as necessary to provide a nonerosive velocity of flow from the basin to a channel.

H. Proposed residential, commercial, or industrial subdivisions shall apply these stormwater management criteria to the land development as a whole. Individual lots in new subdivisions shall not be considered separate land development projects, but rather the entire subdivision shall be considered a single land development project. Hydrologic parameters shall reflect the ultimate land development

and shall be used in all engineering calculations.

I. All stormwater management facilities shall have a maintenance plan which identifies the owner and the responsible party for carrying out the maintenance plan.

J. Construction of stormwater management impoundment structures within a Federal Emergency Management Agency (FEMA) designated 100-year floodplain shall be avoided to the extent possible. When this is unavoidable, all stormwater management facility construction shall be in compliance with all applicable regulations under the National Flood Insurance Program, 44 CFR Part 59.

K. Natural channel characteristics shall be preserved to the maximum extent practicable.

L. Land development projects shall comply with the Virginia Erosion and Sediment Control Act and attendant regulations.

4 VAC 3-20-71. Water quality.

A. Compliance with the water quality criteria may be achieved by applying the performance-based criteria or the technology-based criteria to either the site or a planning area.

B. Performance-based criteria. For land development, the calculated post-development nonpoint source pollutant runoff load shall be compared to the calculated pre-development load based upon the average land cover condition or the existing site condition. A BMP shall be located, designed, and maintained to achieve the target pollutant removal efficiencies specified in Table 1 to effectively reduce the pollutant load to the required level based upon the following four applicable land development situations for which the performance criteria apply:

1. Situation 1 consists of land development where the existing percent impervious cover is less than or equal to the average land cover condition and the proposed improvements will create a total percent impervious cover which is less than the average land cover condition.

Requirement: No reduction in the after development pollutant discharge is required.

2. Situation 2 consists of land development where the existing percent impervious cover is less than or equal to the average land cover condition and the proposed improvements will create a total percent impervious cover which is greater than the average land cover condition.

Requirement: The pollutant discharge after development shall not exceed the existing pollutant discharge based on the average land cover condition.

3. Situation 3 consists of land development where the existing percent impervious cover is greater than the average land cover condition.

Requirement: The pollutant discharge after development shall not exceed (i) the pollutant discharge based on existing conditions less 10% or (ii) the pollutant discharge based on the

average land cover condition, whichever is greater.

4. Situation 4 consists of land development where the existing percent impervious cover is served by an existing stormwater management BMP that addresses water quality.

Requirement: The pollutant discharge after development shall not exceed the existing pollutant discharge based on the existing percent impervious cover while served by the existing BMP.

The existing BMP shall be shown to have been designed and constructed in accordance with proper design standards and specifications, and to be in proper functioning condition.

C. Technology-based criteria. For land development, the post-developed stormwater runoff from the impervious cover shall be treated by an appropriate BMP as required by the post-developed condition percent impervious cover as specified in Table 1. The selected BMP shall be located, designed, and maintained to perform at the target pollutant removal efficiency specified in Table 1. Design standards and specifications for the BMPs in Table 1 which meet the required target pollutant removal efficiency will be available at the department.

Table 1*

Water Quality BMP	Target Phosphorus Removal Efficiency	Percent Impervious Cover
Vegetated filter strip	10%	16-21%
Grassed swale	15%	
Constructed wetlands	30%	22 -37%
Extended detention (2 x WQ Vol)	35%	
Retention basin I (3 x WQ Vol)	40%	
Bioretention basin	50%	38 -66%
Bioretention filter	50%	
Extended detention-enhanced	50%	
Retention basin II (4 x WQ Vol)	50%	
Infiltration (1 x WQ Vol)	50%	
Sand filter	65%	67 -100%
Infiltration (2 x WQ Vol)	65%	
Retention basin III (4 x WQ Vol with aquatic bench)	65%	

* Innovative or alternate BMPs not included in this table may be allowed at the discretion of the local program administrator or the Department. Innovative or alternate BMPs not included in this table which target appropriate nonpoint source pollution other than phosphorous may be allowed at the discretion of the local program administrator or the Department.

4 VAC 3-20-81. Stream channel erosion.

A. Properties and receiving waterways downstream of any land development project shall be protected from erosion and damage due to increases in volume, velocity and peak flow rate of stormwater runoff in accordance with the minimum design standards set out in this section.

B. The plan approving authority shall require compliance with subdivision 19 of 4 VAC 50-30-40 of the Erosion and Sediment Control Regulations, promulgated pursuant to Article 4 (§ 10.1-560 et seq.) of Chapter 5 of Title 10.1 of the Code of Virginia.

C. The plan approving authority may determine that some watersheds or receiving stream systems require enhanced criteria in order to address the increased frequency of bankfull flow conditions brought on by land development projects. Therefore, in lieu of the reduction of the 2-year post-developed peak rate of runoff as required in subsection B of this section, the land development project being considered shall provide 24-hour extended detention of the runoff generated by the 1-year, 24-hour duration storm.

D. In addition to subsections B and C of this section, localities may, by ordinance, adopt more stringent channel analysis criteria or design standards to ensure that the natural level of channel erosion, to the maximum extent practicable, will not increase due to the land development projects. These criteria may include, but are not limited to, the following:

1. Criteria and procedures for channel analysis and classification.
2. Procedures for channel data collection.
3. Criteria and procedures for the determination of the magnitude and frequency of natural sediment transport loads.
4. Criteria for the selection of proposed natural or man-made channel linings.

4 VAC 3-20-85. Flooding.

A. Downstream properties and waterways shall be protected from damages from localized flooding due to increases in volume, velocity and peak flow rate of stormwater runoff in accordance with the minimum design standards set out in this section.

B. The 10-year post-developed peak rate of runoff from the development site shall not exceed the 10-year pre-developed peak rate of runoff.

C. In lieu of subsection B of this section, localities may, by ordinance, adopt alternate design criteria based upon geographic, land use, topographic, geologic factors or other downstream conveyance factors as appropriate.

D. Linear development projects shall not be required to control post-developed stormwater runoff for

flooding, except in accordance with a watershed or regional stormwater management plan.

4 VAC 3-20-86. Regional (watershed-wide) stormwater management plans.

This section enables localities to develop regional stormwater management plans. State agencies intending to develop large tracts of land such as campuses or prison compounds are encouraged to develop regional plans where practical.

The objective of a regional stormwater management plan is to address the stormwater management concerns in a given watershed with greater economy and efficiency by installing regional stormwater management facilities versus individual, site-specific facilities. The result will be fewer stormwater management facilities to design, build and maintain in the affected watershed. It is also anticipated that regional stormwater management facilities will not only help mitigate the impacts of new development, but may also provide for the remediation of erosion, flooding or water quality problems caused by existing development within the given watershed.

If developed, a regional plan shall, at a minimum, address the following:

1. The specific stormwater management issues within the targeted watersheds.
2. The technical criteria in 4 VAC 3-20-50 through 4 VAC 3-20-85 as needed based on subdivision 1 of this section.
3. The implications of any local comprehensive plans, zoning requirements and other planning documents.
4. Opportunities for financing a watershed plan through cost sharing with neighboring agencies or localities, implementation of regional stormwater utility fees, etc.
5. Maintenance of the selected stormwater management facilities.
6. Future expansion of the selected stormwater management facilities in the event that development exceeds the anticipated level.

PART III.
LOCAL PROGRAMS.

4 VAC 3-20-90. Applicability.

This part specifies technical criteria, minimum ordinance requirements, and administrative procedures for all localities operating local stormwater management programs.

4 VAC 3-20-101. Technical criteria for local programs.

A. All local stormwater management programs shall comply with the general technical criteria as outlined in 4 VAC 3-20-60.

B. All local stormwater management programs which contain provisions for stormwater runoff quality shall comply with 4 VAC 3-20-71. A locality may establish criteria for selecting either the site or a planning area on which to apply the water quality criteria. A locality may opt to calculate actual watershed specific or locality wide values for the average land cover condition based upon:

1. Existing land use data at time of local Chesapeake Bay Preservation Act Program or Department storm water management program adoption, whichever was adopted first,
2. Watershed or locality size, and
3. Determination of equivalent values of impervious cover for nonurban land uses which contribute nonpoint source pollution, such as agriculture, forest, etc.

C. All local stormwater management programs which contain provisions for stream channel erosion shall comply with 4 VAC 3-20-81.

D. All local stormwater management programs must contain provisions for flooding and shall comply with 4 VAC 3-20-85.

E. All local stormwater management programs which contain provisions for watershed or regional stormwater management plans shall comply with 4 VAC 3-20-101.

F. A locality that has adopted more stringent requirements or implemented a regional (watershed-wide) stormwater management plan may request, in writing, that the department consider these requirements in its review of state projects within that locality.

G. Nothing in this part shall be construed as authorizing a locality to regulate, or to require prior approval by the locality for, a state project.

4 VAC 3-20-111. Requirements for local program and ordinance.

A. At a minimum, the local stormwater management program and implementing ordinance shall meet the following:

1. The ordinance shall identify the plan-approving authority and other positions of authority within the program, and shall include the regulations and technical criteria to be used in the program.
2. The ordinance shall include procedures for submission and approval of plans, issuance of permits, monitoring and inspections of land development projects. The party responsible for conducting inspections shall be identified. The local program authority shall maintain, either on-site or in local program files, a copy of the approved plan and a record of all inspections for each land

development project.

B. The department shall periodically review each locality's stormwater management program, implementing ordinance, and amendments. Subsequent to this review, the department shall determine if the program and ordinance are consistent with the state stormwater management regulations and notify the locality of its findings. To the maximum extent practicable the department will coordinate the reviews with other local government program reviews to avoid redundancy. The review of a local program shall consist of the following:

1. A personal interview between department staff and the local program administrator or his designee;
2. A review of the local ordinance and other applicable documents;
3. A review of plans approved by the locality and consistency of application;
4. An inspection of regulated activities; and
5. A review of enforcement actions.

C. Nothing in this chapter shall be construed as limiting the rights of other federal and state agencies from imposing stricter technical criteria or other requirements as allowed by law.

4 VAC 3-20-121. Administrative procedures: stormwater management plans.

A. Localities shall approve or disapprove stormwater management plans according to the following:

1. A maximum of 60 calendar days from the day a complete stormwater management plan is accepted for review will be allowed for the review of the plan. During the 60-day review period, the locality shall either approve or disapprove the plan and communicate its decision to the applicant in writing. Approval or denial shall be based on the plan's compliance with the locality's stormwater management program.
2. A disapproval of a plan shall contain the reasons for disapproval.

B. Each plan approved by a locality shall be subject to the following conditions:

1. The applicant shall comply with all applicable requirements of the approved plan, the local program, this chapter and the Act, and shall certify that all land clearing, construction, land development and drainage will be done according to the approved plan.
2. The land development project shall be conducted only within the area specified in the approved plan.
3. The locality shall be allowed, after giving notice to the owner, occupier or operator of the land development project, to conduct periodic inspections of the project.

4. The person responsible for implementing the approved plan shall conduct monitoring and submit reports as the locality may require to ensure compliance with the approved plan and to determine whether the plan provides effective stormwater management.
5. No changes may be made to an approved plan without review and written approval by the locality.

4 VAC 3-20-131. Administrative procedures: exceptions.

A. A request for an exception shall be submitted, in writing, to the locality. An exception from the stormwater management regulations may be granted, provided that: (i) exceptions to the criteria are the minimum necessary to afford relief and (ii) reasonable and appropriate conditions shall be imposed as necessary upon any exception granted so that the intent of the Act and this chapter are preserved.

B. Economic hardship is not sufficient reason to grant an exception from the requirements of this chapter.

4 VAC 3-20-141. Administrative procedures: maintenance and inspections.

A. Responsibility for the operation and maintenance of stormwater management facilities, unless assumed by a governmental agency, shall remain with the property owner and shall pass to any successor or owner. If portions of the land are to be sold, legally binding arrangements shall be made to pass the basic responsibility to successors in title. These arrangements shall designate for each project the property owner, governmental agency, or other legally established entity to be permanently responsible for maintenance.

B. In the case of developments where lots are to be sold, permanent arrangements satisfactory to the locality shall be made to ensure continued performance of this chapter.

C. A schedule of maintenance inspections shall be incorporated into the local ordinance. Ordinances shall provide that in cases where maintenance or repair is neglected, or the stormwater management facility becomes a danger to public health or safety, the locality has the authority to perform the work and to recover the costs from the owner.

D. Localities may require right-of-entry agreements or easements from the applicant for purposes of inspection and maintenance.

E. Periodic inspections are required for all stormwater management facilities. Localities shall either:

1. Provide for inspection of stormwater management facilities on an annual basis; or
2. Establish an alternative inspection program which ensures that stormwater management facilities are functioning as intended. Any alternative inspection program shall be:
 - a. Established in writing;

- b. Based on a system of priorities that, at a minimum, considers the purpose of the facility, the contributing drainage area, and downstream conditions; and
 - c. Documented by inspection records.
- F. During construction of the stormwater management facilities, localities shall make inspections on a regular basis.
- G. Inspection reports shall be maintained as part of a land development project file.

PART IV.
STATE PROJECTS.

4 VAC 3-20-210. Technical criteria and plan requirements for state projects.

- A. This part specifies technical criteria and administrative procedures for all state projects.
- B. Stormwater management plans prepared for state projects shall comply with the technical criteria outlined in Part II (4 VAC 3-20-50 et seq.) of this chapter and, to the maximum extent practicable, any local stormwater management program technical requirements adopted pursuant to the Act. It shall be the responsibility of the state agency to demonstrate that the local program technical requirements are not practical for the project under consideration.
- C. The department may establish criteria for selecting either the site or a planning area on which to apply the water quality criteria.
- D. As a minimum, stormwater management plans and computations shall contain the following:
1. The location and the design of the proposed stormwater management facilities.
 2. Overall site plan with pre-developed and post-developed condition drainage area maps.
 3. Comprehensive hydrologic and hydraulic computations of the pre-development and post-development runoff conditions for the required design storms, considered individually.
 4. Calculations verifying compliance with the water quality requirements.
 5. A description of the requirements for maintenance of the stormwater management facilities and a recommended schedule of inspection and maintenance.
 6. The identification of a person or persons who will be responsible for maintenance.
 7. All stormwater management plans shall be appropriately sealed and signed by a professional in adherence to all minimum standards and requirements pertaining to the practice of that profession

in accordance with Chapter 4 (§ 54.1-400 et seq.) of Title 54.1 of the Code of Virginia and attendant regulations.

4 VAC 3-20-220. Requirements for stormwater management annual standards and specifications.

A. A request for approval of stormwater management standards and specifications may be submitted to the department by a state agency on an annual basis. At a minimum, the following certifications shall accompany the request:

1. Individual stormwater management plans shall be prepared for each of the state projects.
2. The stormwater management plans shall comply with the technical criteria as outlined in Part II (4 VAC 3-20-50 et seq.) of this chapter and, to the maximum extent practicable, any local stormwater management program technical requirements adopted pursuant to the Stormwater Management Act. It shall be the responsibility of the state agency to demonstrate that the local program technical requirements are not practical for the project under consideration.
3. An inspection and maintenance schedule shall be developed and implemented.

B. Copies of such stormwater management specifications and standards including, but not limited to, design manuals, technical guides and handbooks, shall be submitted.

VAC 3-20-230. Administrative procedures: stormwater management plans.

A. Within 30 days after receipt of a complete stormwater management plan submitted by a state agency, the department shall approve or disapprove the plan.

1. The department shall transmit its decision in writing to the state agency which submitted the plan.
2. Disapproved plans shall be revised and resubmitted to the department.

B. Approval of a stormwater management plan for a state project shall be subject to the following conditions:

1. The state agency shall comply with all applicable requirements of the approved plan and this chapter, and shall certify that all land clearing, construction, land development, and drainage will be done according to the approved plan.
2. The land development shall be conducted only within the area specified in the approved plan.
3. No changes may be made to an approved plan without review and written approval by the department.
4. The department shall be notified one week prior to the pre-construction meeting and one week prior to the commencement of land disturbing activity.

5. The department shall conduct periodic inspections of the project to ensure compliance with the plan.

6. The department may require monitoring and reports from the state agency responsible for implementing the plan to ensure compliance with the plan and to determine if the measures required in the plan provide effective stormwater management.

C. Compliance with approved plans shall be subject to the following conditions:

1. Where inspections by department personnel reveal deficiencies in carrying out an approved plan, the responsible state agency shall be issued a notice to comply, with corrective actions specified and the deadline within which the work shall be performed.

2. Whenever the Commonwealth or any of its agencies fail to comply within the time provided in a notice to comply, the director may petition the secretary of a given secretariat or an agency head for a given state agency for compliance. Where the petition does not achieve timely compliance, the director shall bring the matter to the Governor for resolution.

3. Where compliance will require the appropriation of funds, the director shall cooperate with the appropriate agency head in seeking such an appropriation; where the director determines that an emergency exists, he shall petition the Governor for funds from the Civil Contingency Fund or other appropriate source.

4 VAC 3-20-241. Administrative procedures: exceptions.

A. A request for an exception shall be submitted, in writing, to the department. An exception from the stormwater management regulations may be granted, provided that: (i) exceptions to the criteria are the minimum necessary to afford relief and (ii) reasonable and appropriate conditions shall be imposed as necessary upon any exception granted so that the purpose and intent of the Act is preserved.

B. Economic hardship is not sufficient reason to grant an exception from the requirements of this chapter.

4 VAC 3-20-245. Administrative procedures: maintenance and inspections.

A. Responsibility for the operation and maintenance of stormwater management facilities shall remain with the state agency and shall pass to any successor or owner. If portions of the land are to be sold, legally binding arrangements shall be made to pass the basic responsibility to successors in title. These arrangements shall designate for each state project the property owner, governmental agency, or other legally established entity to be permanently responsible for maintenance.

B. At a minimum, a stormwater management facility shall be inspected on an annual basis and after any storm which causes the capacity of the facility principal spillway to be exceeded.

C. During construction of the stormwater management facilities, the department shall make inspections on a regular basis.

D. Inspection reports shall be maintained as part of the land development project file.

PART V.
REPORTING.

4 VAC 3-20-251. Reporting on stormwater management.

The department is required to report to the General Assembly on the extent to which stormwater management programs have reduced nonpoint source pollution to the Commonwealth's waters and mitigated the effects of localized flooding. In order to complete this report, localities with stormwater management programs and state agencies may be asked to voluntarily submit an annual report to the department. Such a request may suggest reporting of data on the number and types of stormwater management facilities installed in the preceding year, the drainage area or watershed size served, the receiving stream or hydrologic unit, a summary of monitoring data, if any, and other data useful in determining the effectiveness of the programs and BMP technologies in current use.

COMMONWEALTH of VIRGINIA

Virginia Stormwater Management Law

2001

Department of Conservation and Recreation
Division of Soil and Water Conservation
203 Governor Street, Suite 206
Richmond, VA 23219-2094

Phone (804) 786-2064



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

2H6V1100

INDEX

STORMWATER MANAGEMENT LAW

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The following is the complete, edited text of Title 10.1, Chapter 6, Article 1.1 of the Code of Virginia as amended through 2000. Please refer to the Code of Virginia for an official copy of the Law.

§ 10.1-603.1. Cooperative state-local program.

The General Assembly has determined that the lands and waters of the Commonwealth are great natural resources; that as a result of intensive land development and other land use conversions, degradation of these resources frequently occurs in the form of water pollution, stream channel erosion, depletion of groundwater resources, and more frequent localized flooding; that these impacts adversely affect fish, aquatic life, recreation, shipping, property values and other uses of lands and waters; that existing authorities under the Code of Virginia do not adequately address all of these impacts. Therefore the General Assembly finds it in the public interest to enable the establishment of stormwater management programs.

§ 10.1-603.2. Definitions.

As used in this article, unless the context requires a different meaning:

"Applicant" means any person submitting a stormwater management plan for approval.

"Board" means the Board of Conservation and Recreation.

"Department" means the Department of Conservation and Recreation.

"Flooding" means a volume of water which is too great to be confined within the banks or walls of the stream, water body or conveyance system and which overflows onto adjacent lands, causing or threatening damage.

"Land development" or *"land development project"* means a manmade change to the land surface that potentially changes its runoff characteristics.

"Linear development project" means a land development project that is linear in nature such as, but not limited to, (i) the construction of electric and telephone utility lines, and natural gas pipelines; (ii) construction of tracks, rights-of-way, bridges, communication facilities and other related structures of a railroad company; and (iii) highway construction projects.

"Local stormwater management program" or *"local program"* means a statement of the various methods employed by a locality to manage the runoff from land development projects and may include such items as local ordinances, policies and guidelines, technical materials, inspection, enforcement, and evaluation.

"Nonpoint source pollution" means pollution whose sources cannot be pinpointed but rather is washed from the land surface in a diffuse manner by stormwater runoff.

"Runoff" means that portion of precipitation that is discharged across the land surface or through conveyances to one or more waterways.

"Stormwater management plan" or "plan" means a document containing material for describing how existing runoff characteristics will be maintained by a land development project.

"Subdivision" means the same as defined in §15.1-465.

"Watershed" means a defined land area drained by a river or stream or system of connecting rivers or streams such that all surface water within the area flows through a single outlet.

§ 10.1-603.3. Counties, cities and towns may by ordinance establish stormwater management programs as a local option; effective date

Each locality may, by ordinance, to be effective on or after July 1, 1990, establish a local stormwater management program which shall include, but is not limited to, the following:

1. Consistency with regulations promulgated in accordance with provisions of this article;
2. Provisions for long-term responsibility for and maintenance of stormwater management control devices and other techniques specified to manage the quality and quantity of runoff; and
3. Provisions for the integration of locally adopted stormwater management programs with local erosion and sediment control, flood insurance, flood plain management and other programs requiring compliance prior to authorizing construction in order to make the submission and approval of plans, issuance of permits, payment of fees, and coordination of inspection and enforcement activities more convenient and efficient both for the local governments and those responsible for compliance with the programs.

§ 10.1-603.4. Development of regulations.

The Board is authorized to promulgate regulations which specify minimum technical criteria and administrative procedures for stormwater management programs in Virginia. In order to inhibit the deterioration of existing waters and waterways, the regulations shall:

1. Require that state and local programs maintain after-development runoff rate of flow, as nearly as practicable, as the pre-development runoff characteristics;

2. Establish minimum design criteria for measures to control nonpoint source pollution and localized flooding, and incorporate the stormwater management regulations promulgated pursuant to the Virginia Erosion and Sediment Control Law, Article 4 (§10.1-560 et seq.) of Chapter 5 of this title, as they relate to the prevention of stream channel erosion. These criteria shall be periodically modified as required in order to reflect current engineering methods;
3. Require the provision of long-term responsibility for and maintenance of stormwater management control devices and other techniques specified to manage the quality and quantity of runoff; and
4. Require as a minimum the inclusion in local programs of certain administrative procedures which include, but are not limited to, specifying the time period within which a local government which has adopted a stormwater management program must grant written approval of a plan, the conditions under which approval shall be granted, the procedures for communicating disapproval, the conditions under which an approved plan may be changed and requirements for inspection of approved projects.

§ 10.1-603.5. State agency projects.

A. After January 1, 1991, a state agency may not undertake any land clearing, soil movement, or construction activity involving soil movement or land development unless the agency has submitted and obtained approval of a stormwater management plan from the Department. In lieu of such a plan, the agency may annually submit stormwater management standards and specifications.

B. Notwithstanding the provisions of this article, all state agencies shall comply with the stormwater management provisions of the Erosion and Sediment Control Law, Article 4 (§10.1-560 et seq.) of Chapter 5 of this title, and related regulations. The Department shall perform random site inspections to assure compliance with this article, the Erosion and Sediment Control Law and regulations promulgated thereunder.

C. The Department shall have thirty days in which to comment on the stormwater management plan, and its recommendations shall be binding on the state agency or the private business hired by the state agency. Individual approval of separate projects is not necessary when annually approved standards and specifications have been approved.

As on-site changes occur, the state agency shall submit changes in the stormwater management plan to the Department.

The state agency responsible for the land-disturbing activity shall ensure compliance with the approved plan or specifications.

§ 10.1-603.6. Involvement of the Department with local programs.

A. The Department shall provide technical assistance, training, research, and coordination in stormwater management technology to the local governments consistent with the purposes of this article.

B. The Department is authorized to review the plan for any project with real or potential interjurisdictional impacts upon the request of one of the involved localities to determine that the plan is consistent with the provisions of this article. Any such review shall be completed and a report submitted to each locality involved within ninety days of such request.

§ 10.1-603.7. Authorization for more stringent regulations.

Localities are authorized to adopt more stringent stormwater management regulations than those necessary to ensure compliance with the Board's minimum regulations, with the exception of regulations related to plan approval, provided that the more stringent regulations are based upon the findings of local comprehensive watershed management studies and that prior to adopting more stringent regulations a public hearing is held after giving due notice.

§ 10.1-603.8. Regulated activities; submission and approval of a control plan; security for performance; exemptions.

A. Except as provided in §10.1-603.5, after the adoption of a local ordinance, a person shall not develop any land for residential, commercial, industrial, or institutional use in that locality until he has submitted a stormwater management plan to the locality that has jurisdiction and has obtained approval of the plan from that locality. The plan may include appropriate maps, mathematical calculations, detail drawings and a listing of all major decisions to assure that the entire unit or units of land will be so treated to achieve the objectives of the local program. Prior to issuance of any permit, the locality may also require an applicant to submit a reasonable performance bond with surety, cash escrow, letter of credit, any combination thereof, or such other legal arrangement acceptable to the locality, to ensure that measures could be taken by the locality at the applicant's expense should he fail, after proper notice, within the time specified to initiate or maintain appropriate actions which may be required of him by the approved stormwater management plan as a result of his land-development project. If the locality takes such action upon such failure by the applicant, the agency may collect from the applicant for the difference should the amount of the reasonable cost of such action exceed the amount of the security held. Within sixty days of the completion of the requirements of the approved stormwater management plan, such bond, cash escrow, letter of credit or other legal arrangement, or the unexpended or unobligated portion thereof, shall be refunded to the applicant or terminated. These requirements are in addition to all other provisions of law relating to the issuance of such plans and are not intended to otherwise affect the requirements for such plans.

B. Notwithstanding any other provisions of this article, the following activities are exempt:

1. Permitted surface or deep mining operations and projects, or oil and gas operations and projects conducted under the provisions of Title 45.1;
2. Tilling, planting or harvesting of agricultural, horticultural, or forest crops;
3. Single-family residences separately built and not part of a subdivision, including additions or modifications to existing single-family detached residential structures;
4. Land development projects that disturb less than one acre of land area; however, the governing body of a locality which has adopted a stormwater management program may reduce this exception to a smaller area of disturbed land or qualify the conditions under which this exception shall apply; and
5. Linear development projects, provided that (i) less than one acre of land will be disturbed per outfall or watershed, (ii) there will be insignificant increases in peak flow rates, and (iii) there are no existing or anticipated flooding or erosion problems downstream of the discharge point.

§ 10.1-603.9. Approved plan required for issuance of grading, building, or other permits.

Upon the adoption of a local ordinance no grading, building or other permit shall be issued for a property unless a stormwater management plan has been approved that is consistent with the local program and this article and unless the applicant has certified that all land clearing, construction, land development and drainage will be done according to the approved plan.

§ 10.1-603.10. Recovery of administrative costs.

Any locality which administers a stormwater management program may charge applicants a reasonable fee to defray the cost of program administration, including costs associated with plan review, issuance of permits, periodic inspection for compliance with approved plans, and necessary enforcement, provided that charges for such costs are not made under any other law, ordinance or program. The fee shall not exceed an amount commensurate with the services rendered and expenses incurred or \$1,000, whichever is less.

§ 10.1-603.11. Monitoring, reports and inspections.

A. The plan-approving authority or, if a permit is issued in connection with land-disturbing activities which involve the issuance of a grading, building, or other permit, the permit-issuing authority (i) shall provide for periodic inspections of the installation of stormwater management measures and (ii) may require monitoring and reports from the person responsible for carrying out the plan, to ensure

compliance with the approved plan and to determine whether the measures required in the plan provide effective stormwater management. The owner, occupier or operator shall be given notice of the inspection and an opportunity to accompany the inspectors. If the permit-issuing authority or plan-approving authority determines that there is a failure to comply with the plan, notice shall be served upon the permittee or person responsible for carrying out the plan by registered or certified mail to the address specified in the permit application or in the plan certification, or by delivery at the site of the development activities to the agent or employee supervising such activities. Where the plan-approving authority serves notice, a copy of the notice shall also be sent to the issuer of the permit. The notice shall specify the measures needed to comply with the plan and shall specify the time within which such measures shall be completed. Upon failure to comply within the time specified, the permit may be revoked and the permittee or person responsible for carrying out the plan shall be deemed to be in violation of this article and upon conviction shall be subject to the penalties provided by §10.1-603.14.

B. Notwithstanding subsection A of this section, the following may be applied:

1. Where a county, city, or town administers the local control program and the permit-issuing authority and the plan-approving authority are not within the same local government department, the locality may designate one department to inspect, monitor, report and ensure compliance.
2. Where a permit-issuing authority has been established, and such authority is not vested in an employee or officer of local government but in the commissioner of revenue or some other person, the locality shall exercise the responsibilities of the permit-issuing authority with respect to monitoring, reports, inspections, and enforcement unless such responsibilities are transferred as provided for in this section.

§ 10.1-603.12. Department to review local and state agency programs.

A. The Department shall periodically conduct a comprehensive review and evaluation of the effectiveness of each local government's and state agency's stormwater management program. The review shall include an assessment of the extent to which the program has reduced nonpoint source pollution and mitigated the detrimental effects of localized flooding. A summary of these reviews and evaluations shall be submitted annually to the General Assembly.

B. If, after such a review and evaluation, a local government is found to have a program which does not comply with the provisions of this article or regulations promulgated thereunder, the Department may issue an order requiring that necessary corrective action be taken within a reasonably prescribed time.

§ 10.1-603.13. Appeals of decisions of counties, cities or towns.

A. An appeal from a decision of a locality concerning an application for approval or disapproval of a stormwater management plan may be taken by the applicant, or any aggrieved party authorized by law, within thirty days after the rendering of such a decision of the locality, to the circuit court of the jurisdiction in which the land development project is located.

B. Judicial review shall be on the record previously established and shall otherwise be in accordance with the provisions of the Administrative Process Act (§9-6.14:1 et seq.).

§ 10.1-603.14. Penalties, injunctions and other legal actions.

Any person who violates any provision of a local ordinance or program adopted pursuant to the authority of this article shall be guilty of a misdemeanor and shall be subject to a fine not exceeding \$1,000 or up to thirty days imprisonment for each violation or both. Such a local ordinance may also include the following sanctions:

1. A locality operating its own program may apply to the circuit court in any jurisdiction wherein the land lies to enjoin a violation or a threatened violation of the provisions of this article or of the local ordinance without the necessity of showing that an adequate remedy at law does not exist.
2. Without limiting the remedies which may be obtained in this section, a locality operating its own program may bring a civil action against any person for violation of any ordinance or any condition of a permit, or any provision of a local program adopted pursuant to this article. The action may seek the imposition of a civil penalty of not more than \$2,000 against the person for each violation.
3. With the consent of any person who has violated or failed, neglected or refused to obey any ordinance or any condition of a permit or any provision of a local program adopted pursuant to this article, the administrator of the local program may provide, in an order issued by the administrator against such person, for the payment of civil charges for violations in specific sums, not to exceed the limit specified in subdivision 2 of this section. Such civil charges shall be instead of any appropriate civil penalty which could be imposed under subdivision 2.

§ 10.1-603.15. Cooperation with federal and state agencies.

Localities operating their own programs and the Department are authorized to cooperate and enter into agreements with any federal or state agency in connection with plans for stormwater management.

2H6V1131

Registration Statement

Notice of Termination

2H6V1132

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION
PERMIT APPLICATION FEE
EFFECTIVE JULY 1, 2002

INSTRUCTIONS

Applicants for individual Virginia Pollutant Discharge Elimination System (VPDES), Virginia Pollution Abatement (VPA), Virginia Water Protection (VWP), Surface Water Withdrawal (SWW), and Ground Water Withdrawal (GWW) Permits are required to pay permit application fees except farming operations engaged in production for market. Fees are also required for registration for coverage under General Permits except for the general permits for sewage treatment systems with discharges of 1,000 gallons per day (GPD) or less and for Corrective Action Plans for leaking underground storage tanks. Except for VWP permits, fees must be paid when applications for permit issuance, reissuance or modification are submitted. Applicants for VWP permits will be notified by the DEQ of the fee due. Applications will be considered incomplete if the proper fee is not paid and will not be processed until the fee is received.

The permit fee schedule is included with this form. Fees for permit issuance or reissuance and for permit modification are included. Once you have determined the fee for the type of application you are submitting, complete this form. The original copy of the form and your check or money order payable to "Treasurer of Virginia" should be mailed to the Department of Environmental Quality, Receipts Control, P.O. Box 10150, Richmond, VA 23240. A copy of the form and a copy of your check or money order should accompany the permit application. You should retain a copy for your records. Please direct any questions regarding this form or fee payment to the DEQ Office to which you are submitting your application.

APPLICANT NAME: K. HANNAHAN AT Prince William LLC SSN/FIN: 22-3647925

ADDRESS: 16559 Smoketree Brook Loop DAYTIME PHONE: (703) 878-2774
Dumfries, VA 22026 Area Code

FACILITY/ACTIVITY NAME: Four Seasons at Historic Virginia

LOCATION: Prince William County

TYPE OF PERMIT APPLIED FOR
(from Fee Schedule): General

TYPE OF ACTION: _____ New Issuance X Reissuance _____ Modification

AMOUNT OF FEE SUBMITTED
(from Fee Schedule): \$600.00

EXISTING PERMIT NUMBER (if applicable): VAR431057

DEQ OFFICE TO WHICH APPLICATION SUBMITTED (check one)

- | | | | | |
|--|--|--|---|---|
| <input type="checkbox"/> Abingdon/SWRO | <input type="checkbox"/> Harrisonburg/VRO | <input type="checkbox"/> Kilmarnock/KO | <input checked="" type="checkbox"/> Woodbridge/NVRO | <input type="checkbox"/> Lynchburg/SCRO |
| <input type="checkbox"/> Richmond/PRO | <input type="checkbox"/> Richmond/Headquarters | <input type="checkbox"/> Roanoke/WCRO | <input type="checkbox"/> Virginia Beach/TRO | |

FOR DEQ USE ONLY

Date: _____
DC #: _____

Original Form and Check - DEQ Accounting Office
Copy of Form and Copy of Check - DEQ Regional or Permit Program Office

2H6V1133

FEE SCHEDULES

A. VSMP Permits. Applications for issuance of new individual VSMP permits, and for permittee initiated major modifications that occur (and become effective) before the stated permit expiration date. [NOTE: VSMP permittees pay an Annual Permit Maintenance Fee instead of a reapplication fee. The permittee is billed separately by DCR for the Annual Permit Maintenance Fee.]

TYPE OF PERMIT	ISSUANCE	MODIFICATION
VSMP Municipal Stormwater / MS4 Individual (Large and Medium)	\$21,300	\$10,650
VSMP Municipal Stormwater / MS4 Individual (Small)	\$2,000	\$1,000

B. Registration Statements for VSMP General Permit Coverage. The fee for filing a permit application (registration statement) for coverage under a VSMP stormwater general permit issued by the permit issuing authority.

TYPE OF PERMIT	ISSUANCE
VSMP Municipal Stormwater / MS4 General Permit (Small)	\$600
VSMP General / Stormwater Management - Phase I Land Clearing ("Large" Construction Activity - Sites or common plans of development equal to or greater than 5 acres)	\$500
VSMP General / Stormwater Management - Phase II Land Clearing ("Small" Construction Activity - Sites or common plans of development equal to or greater than 1 acre and less than 5 Acres)	\$300

C. Permit Maintenance Fees. The annual permit maintenance fees apply to each VSMP permit identified below, including expired permits that have been administratively continued.

TYPE OF PERMIT	MAINTENANCE
VSMP Municipal Stormwater / MS4 (Large and Medium)	\$3,800
VSMP Municipal Stormwater / MS4 Individual (Small)	\$400
VSMP General / Stormwater Management - Phase I Land Clearing ("Large" Construction Activity - Sites or common plans of development equal to or greater than 5 acres)	\$0
VSMP General / Stormwater Management - Phase II Land Clearing ("Small" Construction Activity - Sites or common plans of development equal to or greater than 1 acre and less than 5 Acres)	\$0



Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

**VSMP General Permit Notice Of Termination -
Construction Activity Storm Water Discharges (DCR01)**

(Please Type or Print All Information)

1. Construction Activity Operator

Name: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____ Phone: _____

2. Location of Construction Activity

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

If street address unavailable: Latitude _____ Longitude _____

3. VSMP Storm Water General Permit Number: _____

4. The Reason for Terminating Coverage Under the General Permit (Note: The construction activity operator may only submit a Notice of Termination after one or more of the conditions below have been met):

- ☐ Final stabilization has been achieved on all portions of the site for which the operator is responsible;
- ☐ Another operator has assumed control over all areas of the site that have not been finally stabilized;
- ☐ Coverage under an alternative VPDES or VSMP permit has been obtained; or
- ☐ For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

NOTE: The Notice of Termination must be submitted within 30 days of one of the above conditions being met. Authorization to discharge terminates seven (7) days after the Notice of Termination is submitted. For the purposes of this permit, a Notice of Termination that is mailed is considered to be submitted once it is postmarked.

5. Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

Print Name: _____ Title: _____

Signature: _____ Date: _____

(Please sign in INK. The person signing this form must be associated with the operator identified in Item #1 above.)

For Department of Conservation and Recreation Use Only

Accepted/Not Accepted by: _____ Date: _____



INSTRUCTIONS for FORM DCR 199-147

VSMP General Permit Notice Of Termination - Construction Activity Storm Water Discharges

General

A VSMP General Permit Notice of Termination must be submitted when an operator no longer wishes to be covered under a VSMP General Permit for Storm Water Discharges From Construction Activities.

Section 1 Activity Operator Information

Give the legal name of the person, firm, public organization, or any other entity that was issued the general permit for the site described in this Notice of Termination. Do not use a colloquial name. Enter the complete address and phone number of the operator.

Section 2 Activity Location Information

Enter the activity's official name and complete street address, including city, state and ZIP code. If the activity or site lacks a street address, indicate the latitude and longitude to the nearest 15 seconds of the approximate center of the site.

Section 3 Permit Information

Enter the existing VSMP Storm Water General Permit number assigned to the activity or site identified in Section 1.

Section 4 Reason for Termination

Check the appropriate statement indicating the reason for submitting this Notice of Termination. The Notice of Termination may only be submitted after one or more of the following conditions have been met:

1. Final stabilization has been achieved on all portions of the site for which the operator is responsible;
2. Another operator has assumed control over all areas of the site that have not been finally stabilized;
3. Coverage under an alternative VPDES or VSMP permit has been obtained; or
4. For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

The Notice of Termination must be submitted within 30 days of one of the above conditions being met.

Authorization to discharge terminates seven (7) days after the Notice of Termination is submitted. For the purposes of this permit, a Notice of Termination that is mailed is considered to be submitted once it is postmarked.

Section 5 Certification

State statutes provide for severe penalties for submitting false information on this Notice of Termination.

State regulations require this Notice of Termination to be signed as follows:

For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (1) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; **[Note: if the title of the individual signing this form is "Plant Manager", submit a written verification that the authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures];**

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

The Department of Conservation and Recreation reserves the right to request additional information not directly addressed by the registration statement if, in its discretion, a facility or operation poses a potential impact on water quality.

2H6V1136



INSTRUCTIONS for FORM DCR 199-146

VSMP General Permit Registration Statement - Construction Activity Stormwater Discharges

General

A Registration Statement must be submitted when an operator makes application to the Department of Conservation and Recreation for coverage under the General VSMP Permit for Stormwater Discharges From Construction Activities.

Section 1 Activity Operator Information

For the purposes of this general permit, "Operator" means any person, company, corporation, partnership, etc., associated with a construction project that meets either of the following two criteria: (1) has direct operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a stormwater pollution prevention plan for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the stormwater pollution prevention plan or comply with other permit conditions). The entities who are considered operators will commonly consist of the owner or developer of a project (the party with control of project specifications) and the general contractor (the party with day to day operational control of the activities at the project site which are necessary to ensure compliance with the permit). Contractors and subcontractors who are under the general supervision of the general contractor are not considered operators and would not need to submit a registration statement. Give the legal name of the operator, do not use a colloquial name. Enter the complete address and phone number of the operator. **The permit will be issued to this operator.**

Section 2 Activity Location Information

Enter the activity's official name and complete street address, including city, state and ZIP code. If the site lacks a street address, enter the latitude and longitude to the nearest 15 seconds of the approximate center of the site.

Offsite Support Activities

The general permit may be used to authorize stormwater discharges from activities that are located away from the construction site (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that they meet the following criteria: (1) The support activity is directly related to a construction site that is required to have VSMP permit coverage for discharges of stormwater associated with construction activity; (2) The support activity is not a commercial operation serving multiple unrelated construction projects by different operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and (3) Appropriate controls and measures are identified in a stormwater pollution prevention plan covering the discharges from the support activity areas.

Provide the information required for each offsite support activity seeking coverage. Support activities located off site are not required to be covered under this general permit. Discharges of stormwater from offsite support activities may be authorized under another VSMP permit. Where stormwater discharges from offsite support activities are not authorized under this general permit, the land area of the offsite support activity need not be included in determining the total land disturbance acreage of the activity seeking general permit coverage.

Section 3 Legal Status

Indicate the appropriate legal status of the operator of the site.

Section 4 Nature of the Construction Project

Examples: commercial, residential, agricultural, oil and gas, etc.

Section 5 Name of Receiving Water(s)

Enter the name of the receiving water(s) for all stormwater discharge(s), including any stormwater discharges from offsite support activities to be covered under the permit.

Section 6 Name of MS4 Operator

If the stormwater is discharged through a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4.

Section 7 Estimated Project Start Date

Enter the date project is projected to start.

Estimated Project Completion Date

Enter the estimated project completion date.

Section 8 Total Land Area of the Development

Enter the total area (to the nearest 1/4 acre) of the development (meaning the total acreage of the larger common plan of development or sale). Include the acreage of any offsite support activities to be covered under the permit.

Estimated Acres to be Disturbed

Enter an estimate of the total number of acres of the site (to the nearest 1/4 acre) on which soil will be disturbed.

Section 9 Larger Common Plan of Development or Sale

Indicate if the area to be disturbed by the construction activity is part of a larger common plan of development or sale.

Section 10 Map

Attach a topographic map or other map which clearly shows the location of the construction activity, the area to be disturbed, and the receiving stream(s) for the stormwater discharge(s), including any offsite support activities to be covered under the permit.

Section 11 Location of Pollution Prevention Plan (SWPPP)

A stormwater pollution prevention plan (SWPPP) must be prepared in accordance with the requirements of the General VSMP Permit for Discharges of Stormwater from Construction Activities prior to submitting this Registration Statement. Give the location where the stormwater pollution prevention plan for the site may be viewed, and the name and phone number of a contact person. The contact person should be a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Responsible Land Disturber (RLD), or other knowledgeable person who (i) holds a certificate of competence from the board in the area of project inspection; or (ii) is enrolled in the board's training program for project inspection or combined administrator and successfully completes such program within one year of enrollment.

Section 12 Permanent BMPs That Will Be Installed

Attach a list of the permanent BMPs (both structural and non-structural) that will be installed at the construction site. For each BMP, include the following information:

- Type of BMP to be installed
- Geographic location (county - State Hydrologic Unit Code)
- Waterbody the BMP will discharge into
- Number of acres that will be treated (to the nearest quarter acre)

Section 13 Certification

The operator identified in Section 1 of this Registration Statement is responsible for certifying and submitting this Registration Statement. Please sign the form in INK. State statutes provide for severe penalties for submitting false information on this Registration Statement. State regulations require this Registration Statement to be signed as follows:

For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (1) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; **[Note: if the title of the individual signing this form is "Plant Manager", submit a written verification that the authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures].**

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

The Department of Conservation and Recreation reserves the right to request additional information not directly addressed by the Registration Statement if, in its discretion, a facility or operation poses a potential impact on water quality.

VPDES General Permit Registration Statement - Construction Activity Storm Water Discharges (VAR10)

(Please Type or Print All Information)

1. **Construction Activity Operator** (NOTE: The permit will be issued to this operator, and the Certification in Item #13 must be signed by the appropriate person associated with this operator [see the instructions])

Name: K. Adamson & Paul Williams, LLC

Mailing Address: 16559 Sparkling Brook Loop

City: Dumfries

State: VA

Zip: 22026

Phone: 703-878-2774

2. **Location of Construction Activity**

Name: Four Seasons at Historic Virginia

Address: 16559 Sparkling Brook Loop

City: Dumfries

State: VA

Zip: 22026

If street address unavailable: Latitude _____

Longitude _____

Location of all Offsite Support Activities to be Covered Under the Permit

Name: N/A

Address: _____

City: _____

State: _____

Zip: _____

If street address unavailable: Latitude _____

Longitude _____

2H6V1138

3. **Status:** Federal ☐ State ☐ Public ☐ Private ☒ (Check one only)

4. **The Nature of the Construction Project** (e.g., commercial, industrial, residential, agricultural, oil and gas, etc.):

Residential

5. **Name of the Receiving Water(s):** Town's Creek

6. **If the Discharge is Through a Municipal Separate Storm Sewer System (MS4), the Name of the Municipal Operator of the Storm Sewer:** N/A

7. **Estimated Project Start Date:** July 2001 **Estimated Project Completion Date:** July 2008

8. **Total Land Area of Development** (to the nearest quarter acre): 352 AC

Estimated Area to be Disturbed (to the nearest quarter acre): 183.25 AC

9. **Is the area to be disturbed by the construction activity part of a larger common plan of development or sale?** Yes ☒ No ☐

10. **Map:** Attach a topographic map or other map which clearly shows the location of the construction activity, the area to be disturbed (including offsite support activities), and the receiving stream(s) for the storm water discharge(s).

NOTE: A storm water pollution prevention plan (SWPPP) must be prepared in accordance with the requirements of the General VPDES Permit for Discharges of Storm Water from Construction Activities prior to submitting this Registration Statement. By signing this Registration Statement you are certifying that the SWPPP has been prepared.

11. **Location Where the SWPPP May be Viewed, and the Name and Phone Number of a Contact Person:** (NOTE: The contact person should be a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Responsible Land Disturber (RLD), or other knowledgeable person who possesses the skills to assess conditions at the construction site that could impact storm water quality)

Location of SWPPP: Four Seasons, 16559 Sparkling Brook Loop, Dumfries VA 22026

Contact Person Name: John Snyder

Phone Number: 703-878-2774

12. **Permanent BMPs:** Attach a list of permanent BMPs (both structural and non-structural) that will be installed at the construction site. For each BMP, include the following information: (a) Type of BMP to be installed; (b) Geographic location (county - State Hydrologic Unit Code); (c) Waterbody the BMP will discharge into; and, (d) Number of acres that will be treated (to the nearest quarter acre).

13. **Certification:** "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

Print Name: John S. Snyder

Title: Dir. of Eng.

Signature: [Signature]

Date: 6/9/04

(Please sign in INK. The person signing this form must be associated with the operator identified in Item #1 above.)

For Department of Environmental Quality Use Only

DEQ-WATER FORM SWGP-VAR10-RS (07/04)

Accepted/Not Accepted by: _____

Date: _____

Topo _____ Water Body _____ Basin _____ Class _____ Section _____ Special Standards _____

FOUR SEASONS BMP FACILITIES:

**PHASE 4 SECTION 1: EXTENDED DETENTION DRY POND,
BMP COVERAGE PROVIDED FOR 120.86 ACRES**

**PHASE 6 SECTION 1: 2-EXTENDED DETENTION DRY PONDS
BMP COVERAGE PROVIDED FOR 80.9 ACRES**

2H6V1139

VSMP General Permit (DCR01)- Permanent BMP Information

Construction Activity Operator: K. Hovnanian Homes of Virginia

Project Name: Four Season-Historic Virginia, Phase 6 Section 1

	(a) Type of BMP to be Installed	(b) Geographic Location (County HUC code	© Waterbody BMP will discharge to	(d) Total Acres treated by BMP
BMP # 1		#		
BMP # 2				
BMP # 3				
BMP # 4				

2H6V1140

Here were the \$ 500.00 Check copy go's

2H6V1141

Record of Land Disturbance

2H6V1143

SWPPP Record of Land Disturbance

[illegible]

2H6V1144

SWPPP Record of Land Disturbance

[illegible]

2H6V1145

SWPPP Record of Land Disturbance

[illegible]

2H6V1146

SWPPP Record of Land Disturbance

[illegible]

2H6V1147

Exhibit D

2H6V1148

Record of Inspections

2H6V1149

Exhibit E

2H6V1150

Record of Contractor Certification

2H6V1151

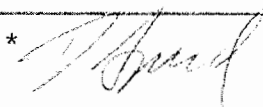
December 8, 2005

Contractor Certification

"I certify under penalty of law that I understand the terms and conditions of this Virginia Pollutant Discharge Elimination System (VPDES) general permit that authorizes the storm water discharges from the construction activity identified as part of this certification."

Site: Four Seasons- Four Seasons Dr, SSOF, Ph 2 Sec 2 Outfall, Ph 4 Sec 1 Outfall, Ph 7 Sec 1 SWM, Ph 8 Sec 1 SWM, Rec Center (aka Ph 1 Sec 2), Ph 2 Sec 1, Ph 2 Sec 2, Ph 3 Sec 1, Ph 4 Sec 1, Ph 5 Sec 1, Ph 5 Sec 2, Ph 6 Sec 1, Ph 7 Sec 1, & Ph 8 Sec 1 * The acknowledgment / execution of this Contractor's Certification Form by the Contractor is only valid while this Contractor is active onsite performing earthwork and grading to the extent as conditioned in the fully executed Agreement's Scope of Work between the Contractor and the Developer and/or Applicant for Work performed on the above referenced projects. Developer will supply a full copy of permit to the contractor.

Note: The Developer is the party that is ultimately responsible for this permit and that the Contractor acknowledges that the Developer will document the inspections and perform the paperwork required for the permit with the input from the appropriate WAH, Inc. site superintendent.

Contractor # ____	
Name:	David M. Speed
Title:	V.P. Engineering
Firm: Name:	William A. Hazel, Inc.
Address:	4305 Hazel Park Court
	P.O. Box 600
	Chantilly, VA 20151
Telephone:	703-378-8300 Fax 703-378-7623
Date:	December 08, 2005
Signature:	* 

Authorized Representative Letter to DCR

2H6V1154

Exhibit G

2H6V1155

Wetland Permit Information

2H6V1156

APPROVED

10/1/00

OFFICE OF PLANNING

[Signature]

FOUR SEASONS IN HISTORIC VIRGINIA

FLOODPLAIN STUDY

FOR

COUNTY OF PRINCE WILLIAM

Plan # 01-00031

Project # 010488

Project Name – FOUR SEASONS IN HISTORIC VA.

PREPARED FOR:

K. HOVNANIAN AT PC HOMES

PREPARED: JULY 2000

REVISED: SEPTEMBER 2002

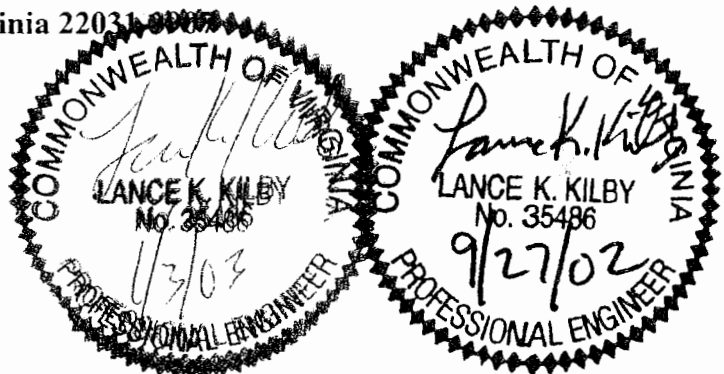
PREPARED BY:

christopher consultants, ltd.

9900 Main Street

Suite 400

Fairfax, Virginia 22031-9900



2H6V1157

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A.	Tc Computations
B.	Ultimate Discharges
IV.	TR-55
1.0	Pre Development
A.	Tc Computations
B.	CN Computations
C.	Hydrographs
2.0	Post Development
A.	Tc Computations
B.	CN Computations
C.	Hydrographs
V.	HEC-2 / BOSS ANALYSIS
VI.	CORRESPONDENCE

SECTION 1
FLOODPLAIN STUDY NARRATIVE

2H6V1159

Introduction

Four Seasons in Historic Virginia is located northeast of the intersection between I-95 and Rt. 234. Quad sheets 8189, 8190, 8289 and 8290. The project consists of 1500 residential units, a recreational center, infrastructure improvements, and private roads. The Four Seasons project is bounded to the north by Powells Creek. Two drainage areas within this study drain to Powells Creek. A floodplain study, sealed in December 1988, was conducted for Powells Creek by Dewberry and Davis. Runoff leaves the property by way of only one other outlet, a double box culvert running under I-95. An aerial topographic survey and a land title survey were both conducted by Odyssey and Associates, Inc., in March of 1999, and were both utilized in this study. Also, a field topographic survey of an area downstream of the subject property and just beyond a double box culvert under I-95 was provided by christopher consultants, ltd. in February of 2000.

The current floodplain study we have prepared is based on peak flows. Ultimate development conditions, based on current zoning, were assumed offsite and used in conjunction with the onsite development conditions as shown on the Four Seasons Preliminary Plan (PWC#00-00206) to develop the hydrologic model. Additionally, Pond 4 (as referenced in the Preliminary Plan) has been included in the current model as final design for such has been completed and is currently being submitted as part of the Four Seasons Drive Phase 1B Plan (PWC# 00-00383). A pond has also been added to Watershed 3, of which design has been completed, and is being submitted as part of the Four Seasons Phase 4, Section 1, plan (PWC #02-00584).

This study also shows the final RPA alignment. The RPA is based on the delineation shown on the Preliminary PASA (PWCO#95-0311 SD PA, approved May 16, 1995) provided by Wetlands Studies and Solutions. It has been modified using the 2' contour interval aerial topography that was developed for this site. The Preliminary PASA utilized the 5' contour interval aerial topography provided by Prince William County.

Hydrology

Divides of the drainage areas to be included in this study were determined using the aerial survey obtained from Odyssey and Associates, and Prince William County Topographic Maps. PWC Topographic Maps had to be utilized because of the lack of aerial in some offsite areas. The PWC Topographic Maps were not used solely because of the greater level of precision shown on the aerial.

The time of concentration for all drainage areas within this study, except Watershed 3, were calculated by the SCS TR-55 method. 100' of sheet flow was assumed in all calculations. The computations have been included in this report. The time of concentration for Watershed 3 was taken from PWC# 02-00584. The flow paths for each subarea are shown on the schematic included in this report.

Per PWC DCSM (for drainage areas larger than 200 acres), the Soil Conservation Service TR-55 Method was used to estimate peak flows for all runoff routed into the double box culvert under I-95. Within this report, the drainage areas feeding into this culvert are referred to as WS 1, WS 4-1, WS 4-2, and I-95 runoff, respectively. In determining the pre-development RCN's, the soils and offsite zoning contained within these drainage areas, obtained from the online Prince William County Mapper, were overlaid along with the current onsite conditions onto the drainage areas. In determining the post-development RCN's, the current onsite conditions overlay was replaced by the layout shown in the Four Seasons Preliminary Plan (PWC #00-00206). To classify soils according to the TR-55 classification the Soil Survey of Prince William County, Virginia by the Soil Conservation Service, issued August 1989, was used. In both calculations, ultimate development conditions were assumed offsite. Pond 2 software was used to develop a routing table for the pond contained within WS 4-2. A Schematic was developed to show the drainage area, RCN, Tc, and channel length for each subarea and is included in this report. This schematic was then used to input the data for the TR-55 runs. TR-55 was used to develop the 100-yr flood hydrographs for each drainage area. A composite 100-yr storm event hydrograph was produced in Excel and is included in this report. This composite hydrograph was developed by adjusting each of the subarea hydrographs timeline by their corresponding travel time to the outlet point (the inlet of the double box culvert under I-95) and then adding the resulting hydrographs.

The Rational Method was used to compute peak flows for the 2 drainage areas within this study dumping into Powells Creek. Within this report, these drainage areas are referred to as WS 2 and WS 3, respectfully. In determining the pre-development CN's, offsite zoning, obtained from the online Prince William County Mapper, was overlaid along with current onsite conditions onto the drainage areas. In determining the post-development CN's, the current onsite conditions overlay was replaced by the layout shown in the Four Seasons Preliminary Plan (PWC #00-00206). In both calculations, ultimate development conditions were assumed offsite. Once the Tc's were calculated, rainfall intensities for the 100 year storm were then determined using exhibit 5 in Section 700 of the PWC DCSM. Q was then calculated per PWC DCSM Rational Method Equation. The computations and results have been included in this report. A Schematic was developed to show the areas, CN, Tc, and channel lengths and has been included in this report.

Hydraulics

A field investigation was conducted to determine the typical channel geometry and roughness coefficients for the channel and overbanks. These values were submitted to the county and an approval letter, dated April 11, 2000, was obtained from Oscar Guzman of Prince William County Watershed Management. This letter has been included in the report and plans.

The entire study was modeled in the Boss software package. The input was entered in Boss's HEC-2 module. Cross sections, perpendicular to the flowlines, were cut from the topographical map obtained from Odyssey and Associates aerial survey. These sections were taken at 100 ft intervals along the floodplain reach with location adjustments being made as deemed necessary. These sections were then altered to include the channel geometry as observed in the field. The approved roughness coefficients were input into the HEC-2 model. The double box culvert running under I-95 was modeled using Boss's Special Culvert submodule. The pond previously mentioned was simplified by modeling it using Boss's Special Culvert submodule and restricting the water surface elevation by inputting a rating table at the cross section representing the breast of the dam. The Special Culvert input parameters are detailed in the output included in this report. All HEC-2 input files have been included on disk, per PWC DCSM.

All normal depth calculations were performed in Boss's HydroCalc module and the results have been included in this report and the plans.

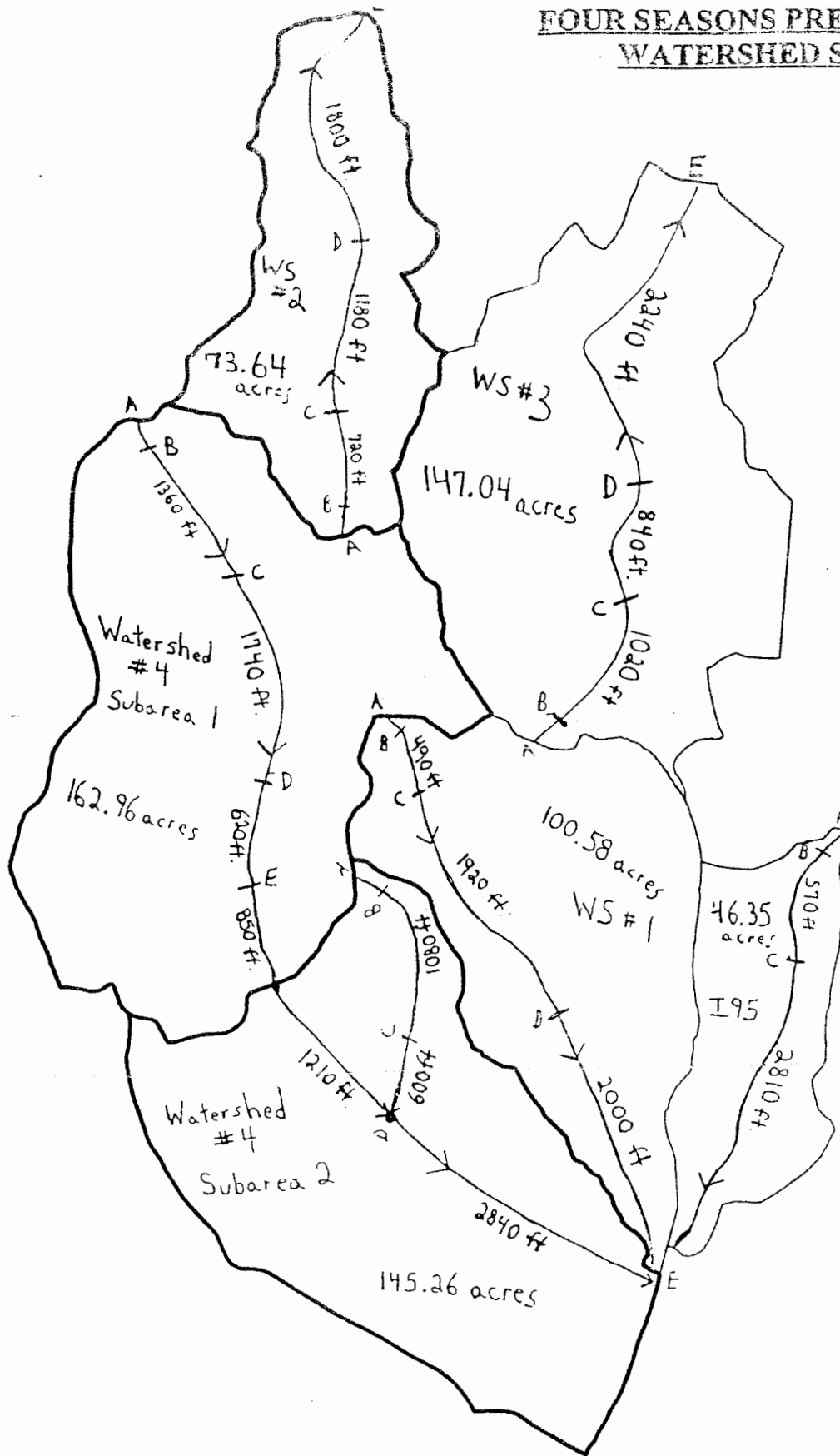
In the analysis, peak flows at the outlet points were used for the entire reach for WS 2. Peak flow to the Watershed 3 pond was determined and routed through the pond. All pond flows and routings are included in this booklet, and are taken from PWC#02-00584. The 100-yr outflow from the pond was then added to the 100-yr flow from the rest of the watershed to arrive at a conservative discharge at the base of the channel. Peak flow for WS 4 was reduced just upstream of the point where the flow from WS 1 is routed into WS 4. By way of a rating table, the designed 100-yr storm event water surface elevation (as shown in Four Seasons Drive Phase 1B Plan-PWC# 00-00383) for the pond in subarea WS 4-2 was held. Upstream of the breast of the dam the flow was increased to the peak flow for subarea WS 4-2. Peak flow for WS 1 was reduced just upstream of the outlet point for the runoff from I-95 that is being routed onto the property.

The 100-year water surface calculations were performed using Boss's HEC-2 module. The HEC-2 analysis was run directly from the previously mentioned HEC-2 input files. The resulting water surface elevation was plotted on the cross sections with the "Boss" software. The resulting water surface was profiled with the "Boss" software. The resulting floodplain has mapped on the aerial topographical map with Boss's floodplain mapping module. Detailed reports of all input and analysis results, produced by the Boss software, have been included in this booklet.

SECTION II
SITE SCHEMATIC

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FOUR SEASONS PRE-DEVELOPMENT WATERSHED SCHEMATIC



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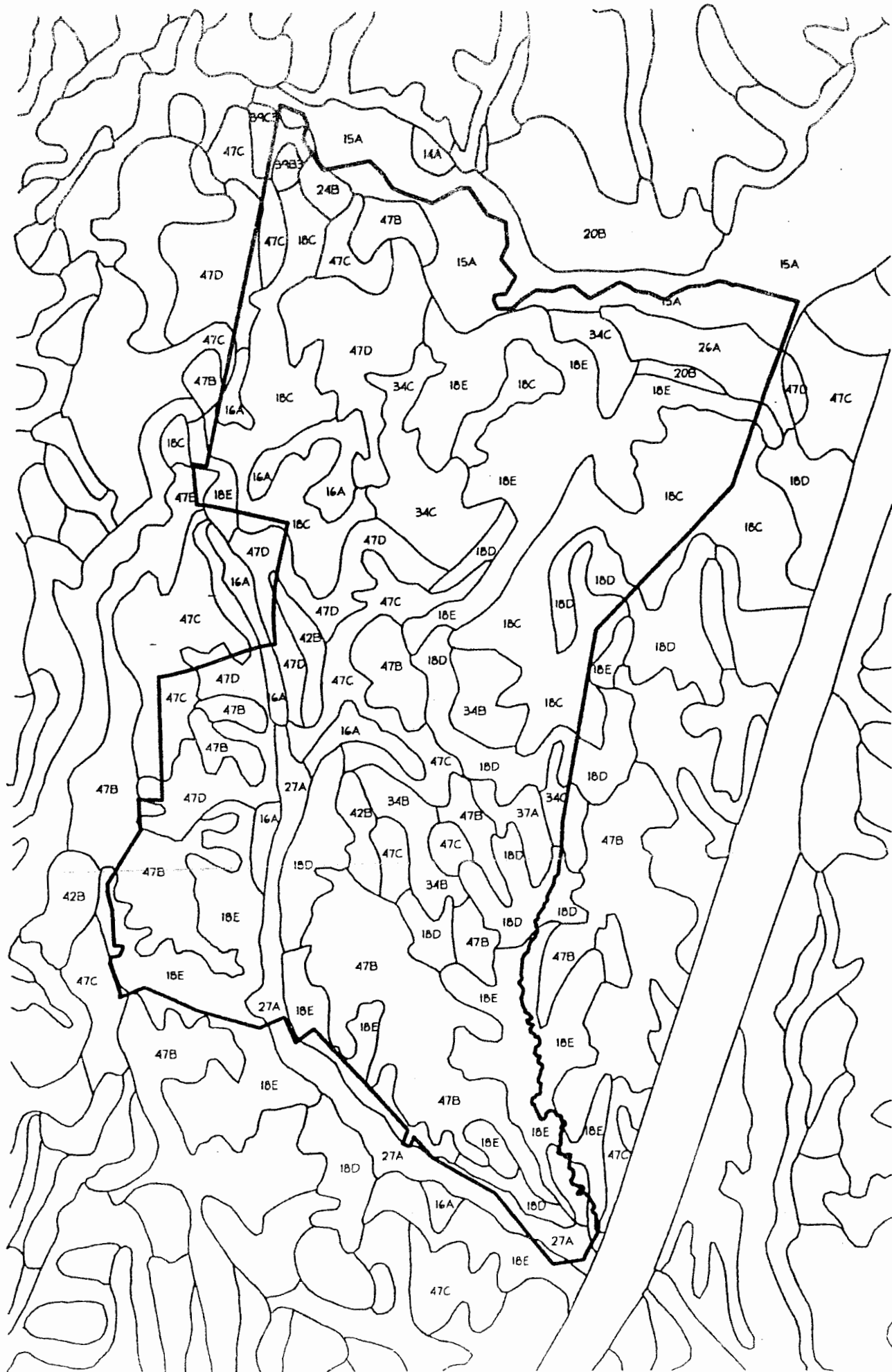
FOUR SEASONS AREA ZONING



Zoning Districts by Use Code

A-1	OX(F)	RD
B-1	OX(H)	RE
B-2	OX(M)	RM-1
B-3	O(L)	RM-2
B-R	PBD	RMH
M/T	PMD	SR-6
M-1	PMR	R-10
M-2	RPC	R-20
SRR1	RR5	FCD
SRR3	RR7.5	

2H6V1168



SCC SOIL SURVEY OF PWC, VA

HYDROLOGIC SOILS

<u>SYMBOL</u>	<u>NAME</u>	<u>HYDROLOGIC SOIL GROUP</u>
14A	CODURUS LOAM	C
15A	COMUS LOAM	B
16A	DELANCO FINE SANDY LOAM	C
18C	DUMFRIES SANDY LOAM	B
18D	DUMFRIES SANDY LOAM	B
18E	DUMFRIES SANDY LOAM	B
20B	EL SINBORO SANDY LOAM	B
24B	GLENELG-BUCKHALL COMPLEX	B
26A	HATBORO SILT LOAM	D
27A	HATBORO-CODURUS COMPLEX	D
34B	LUNT LOAM	C
34C	LUNT LOAM	C
36D	MARR VERY FINE SANDY LOAM	B
37A	MARUMSCO LOAM	C
39B3	MINNIEVILLE CLAY LOAM	C
39C3	MINNIEVILLE CLAY LOAM	C
42B	NEABSCO-QUANTICO COMPLEX	C
47B	QUANTICO SANDY LOAM	B
47C	QUANTICO SANDY LOAM	B
47D	QUANTICO SANDY LOAM	B

2H6V1170

References

1. Air Survey and Design, Inc. of Vienna, Virginia for Prince William County Department of Public Works Topographic Maps, Digital.
2. Prince William County Office of Mapping, Soils Maps Digital.
3. Elder, John H., Jr. Soils of Prince William County, Virginia, Virginia Polytechnic Institute and State University, Updated.
4. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 55, Urban Hydrology for Small Watersheds, 2nd Edition, Washington, DC. June 1986.
5. Prince William County Planning Office, Comprehensive Planning, Prince William County Virginia, Land Use Plan, Adopted August 4, 1998.
6. U.S. Army Corps of engineers, HEC-2 Water Surface Profiles, Computer Program, Davis California, September 1988.
7. Prince William County, Department of Development Administration, Design and Construction Standards Manual effective August 20, 1989.
8. Virginia Department of Highways and Transportation, Drainage Manual, January 1, 1980. Reprinted March 1986.
9. TR-55/ Pond 2 Version 5.20, Hasted Methods, Inc., 1986, 1987, 1988, 1989.
10. Boss RMS for Autocad Version 4.0 Windows, Boss International, Inc., 1993-99.

2H6V1171

SECTION III
RATIONAL METHOD

2H6V1172

PRE DEVELOPMENT WATERSHED 2

Tc COMPUTATIONS FOR: WATERSHED 2

SHEET FLOW (Applicable to Tc only)

Segment ID	AB	
Surface description	Wooded	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	7.800
Land slope, s	ft/ft	0.0500
	0.8	
	.007 * (n*L)	
T =	hrs	0.16
		= 0.16
	0.5	0.4
	P2	* s

SHALLOW CONCENTRATED FLOW

Segment ID	BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	720.0
Watercourse slope, s	ft/ft	0.0500
	0.5	
Avg.V = Csf * (s)	ft/s	3.6078
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
T = L / (3600*V)	hrs	0.06
		= 0.06

CHANNEL FLOW

Segment ID	CD	DE	
Cross Sectional Flow Area, a	sq.ft	1.00	1.00
Wetted perimeter, Pw	ft	3.00	3.00
Hydraulic radius, r = a/Pw	ft	0.333	0.333
Channel slope, s	ft/ft	0.0420	0.0280
Manning's roughness coeff., n		0.0350	0.0390
	2/3	1/2	
	1.49	* r	* s
V =	ft/s	4.1943	3.0734
	n		
Flow length, L	ft	1180	1800
T = L / (3600*V)	hrs	0.08	+ 0.16 = 0.24

.....
 TOTAL TIME (hrs) 0.46

2H6V1173

Quick TR-55 Ver.5.46 S/N:
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SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

PRE DEVELOPMENT WATERSHED 2

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
WATERSHED 2	Tc	0.46

2H6V1174

Quick TR-55 Ver.5.46 S/N:
 Executed: 11:21:14 04-19-2000 c:\tr55\PRE3.TCT

PRE DEVELOPMENT WATERSHED 3

Tc COMPUTATIONS FOR: WATERSHED 3

SHEET FLOW (Applicable to Tc only)

Segment ID	AB	
Surface description	Wooded	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	7.800
Land slope, s	ft/ft	0.0700
	0.8	
	.007 * (n*L)	
T =	hrs	0.14
		= 0.14
	0.5	0.4
	P2	* s

SHALLOW CONCENTRATED FLOW

Segment ID	BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	1020.0
Watercourse slope, s	ft/ft	0.0760
	0.5	
Avg.V = Csf * (s)	ft/s	4.4480
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
T = L / (3600*V)	hrs	0.06
		= 0.06

CHANNEL FLOW

Segment ID	CD	DE
Cross Sectional Flow Area, a	sq.ft	4.00
Wetted perimeter, Pw	ft	6.00
Hydraulic radius, r = a/Pw	ft	0.667
Channel slope, s	ft/ft	0.0330
Manning's roughness coeff., n		0.0500
	2/3	1/2
	1.49	* r
V =	ft/s	4.1312
		3.4830
	n	
Flow length, L	ft	840
		2240
T = L / (3600*V)	hrs	0.06
		+ 0.18
		= 0.24

.....
 TOTAL TIME (hrs) 0.44

2H6V1175

Quick TR-55 Ver.5.46 S/N:
Executed: 11:21:14 04-19-2000 c:\tr55\PRE3.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

PRE DEVELOPMENT WATERSHED 3

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
WATERSHED 3	Tc	0.44

2H6V1176

RRF DEVELOPMENT

$$Q = C_f * C * I * A$$

PROJECT: FOUR SEASONS
IN HISTORIC VA
TASK: FLOODPLAIN STUDY
ENGINEER: DAVID MAXWELL
DATE: APRIL 10, 2000

WS # 2

	A	C	C _f	I
Wooded + Brush	73.64	0.35	1.25	5.50

$$Q = 177.20$$

WS # 3

	A	C	C _f	I
Wooded + Brush	147.04	0.35	1.25	5.60

$$Q = 360.25$$

NOTE: Rational Formula per DCSM of PWC

2H6V1177

Quick TR-55 Ver.5.46 S/N:
 Executed: 11:29:54 04-19-2000 c:\tr55\POST2.TCT

POST DEVELOPMENT WATERSHED 2

Tc COMPUTATIONS FOR: WATERSHED 2

SHEET FLOW (Applicable to Tc only)

Segment ID	AB	
Surface description	Wooded	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	7.800
Land slope, s	ft/ft	0.0540
	0.8	
	.007 * (n*L)	
T =	hrs	0.15 = 0.15
	0.5 0.4	
	P2 * s	

SHALLOW CONCENTRATED FLOW

Segment ID	BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	760.0
Watercourse slope, s	ft/ft	0.0540
	0.5	
Avg.V = Csf * (s)	ft/s	3.7493
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
T = L / (3600*V)	hrs	0.06 = 0.06

CHANNEL FLOW

Segment ID	CD	DE
Cross Sectional Flow Area, a	sq.ft	1.00
Wetted perimeter, Pw	ft	3.00
Hydraulic radius, r = a/Pw	ft	0.333
Channel slope, s	ft/ft	0.0360
Manning's roughness coeff., n		0.0350
		0.0390
	2/3 1/2	
V =	ft/s	3.8832 3.1278
	n	
Flow length, L	ft	840 2100
T = L / (3600*V)	hrs	0.06 + 0.19 = 0.25

.....
 TOTAL TIME (hrs) 0.46

2H6V1178

Quick TR-55 Ver.5.46 S/N:
Executed: 11:29:54 04-19-2000 c:\tr55\POST2.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

POST DEVELOPMENT WATERSHED 2

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
WATERSHED 2	Tc	0.46

2H6V1179

POST DEVELOPMENT

WS # 2

$$Q = C_i * C * I * A$$

PROJECT: FOUR SEASONS
IN HISTORIC VA
TASK: FLOODPLAIN STUDY
ENGINEER: ROBERT BUTLER
DATE: SEPTEMBER, 2002

WEIGHTED AVG OF C

	<u>A</u>	<u>c</u>	<u>Weight</u>
Rd + Lot	25.62	0.65	16.653
Open Sp	0.4	0.35	0.14
Wooded	44.46	0.35	15.561
Ponds	1.37	1.00	1.37
Easemts	0.13	0.35	0.0455
	<u>71.98</u>		<u>33.7695</u>

$$C = 0.47$$

$C_i = 1.25$
 $C = 0.47$
 $I = 5.50$
 $A = 72.15$

$$Q = 232.17$$

WS # 3

Time of concentration taken from PWC# 02-00584, and is a conservative estimate.

WEIGHTED AVG OF C

To Pond

	<u>A</u>	<u>c</u>	<u>Weight</u>
Rd + Lot	45.4	0.65	29.51
Open sp	23.28	0.35	8.148
Wooded	42.51	0.35	14.8785
Ponds	1.27	1.00	1.27
Easemts	1.7	0.35	0.595
Cem	0.19	0.35	0.0665
Rec	4.47	0.80	3.576
Offsite	25.08	0.80	20.064
	<u>143.9</u>		<u>78.108</u>

$$C = 0.54$$

$T_c = 10 \text{ min.}$
 $C_i = 1.25$
 $C = 0.54$
 $I = 8.1$
 $A = 143.9$

$$Q = 789.64$$

Uncontrolled

	<u>A</u>	<u>c</u>	<u>Weight</u>
Rd + Lot	9.7	0.65	6.305
Wooded	11.82	0.35	4.137
	21.52		10.442

$$C = 0.498$$

$$T_c = 10 \text{ min.}$$

$$C_t = 1.25$$

$$C = 0.498$$

$$I = 8.1$$

$$A = 21.52$$

$$Q = 108.53$$

Notes:

Uncontrolled Peak + Peak Release from Pond = Flow to Powell's Creek

$$108.53 + 375.84 = 484.37 \text{ cfs}$$

(Conservative method based on flows.)

Peak Release from Pond Taken from PWC Plan # 02-00584. See excerpts on following page.

Pond Routings from PWC # 02-00584 are shown on the following pages.

$$\text{Flow for Post-development without the pond} = 789.64 + 108.53 = 898.17 \text{ cfs}$$

(Conservative Method)

2H6V1181

DRAINAGE TO POND

A= 143.9
C= 0.54197

115.1 AC @ .59
28.8 AC @ .35

UNIT HYDROGRAPH

Tc=10 min

T(hr)	T (min)	2-YR Cf= 1.0		10-YR Cf= 1.0		100-YR SDF. Cf= 1.25	
		I (in/hr)	Q (cfs)	I (in/hr)	Q (cfs)	I (in/hr)	Q (cfs)
0.000	0	0	0.00	0	0.00	0	0.00
0.083	5	2.57	200.43	3.25	253.47	3.68	358.75
0.167	10	4.60	358.75	5.92	461.70	8.10	789.64
0.250	15	3.40	265.16	4.53	353.29	6.47	630.74
0.333	20	2.36	184.06	3.14	244.89	4.44	432.84
0.417	25	1.82	141.94	2.43	189.51	3.50	341.20
0.500	30	1.49	116.20	1.99	155.20	2.86	278.81
0.583	35	1.25	97.49	1.67	130.24	2.43	236.89
0.667	40	1.06	82.67	1.41	109.97	2.17	211.55
0.750	45	0.91	70.97	1.21	94.37	1.93	188.15
0.833	50	0.78	60.83	1.04	81.11	1.78	173.53
0.917	55	0.69	53.81	0.92	71.75	1.67	162.80
1.000	60	0.60	46.79	0.80	62.39	1.58	154.03
1.083	65	0.55	42.89	0.73	56.93	1.45	141.36
1.167	70	0.50	38.99	0.67	52.25	1.32	128.68
1.250	75	0.45	35.10	0.60	46.79	1.19	116.01
1.333	80	0.40	31.20	0.53	41.33	1.05	102.36
1.417	85	0.35	27.30	0.47	36.66	0.92	89.69
1.500	90	0.30	23.40	0.40	31.20	0.79	77.01
1.583	95	0.25	19.50	0.33	25.74	0.66	64.34
1.667	100	0.20	15.60	0.27	21.06	0.53	51.67
1.750	105	0.15	11.70	0.20	15.60	0.40	38.99
1.833	110	0.10	7.80	0.13	10.14	0.26	25.35
1.917	115	0.05	3.90	0.07	5.46	0.13	12.67
2.000	120	0.00	0.00	0.00	0.00	0.00	0.00

POST INFLOW HYDROGRAPHS

100-YR. RATING TABLE

SYSTEM CONNECTIVITY

>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR 8'x7' BOX

Crest elev.(ft)? 105.5
Weir length (ft)? 30'
Weir coefficient? 3.0
Orifice coefficient? .6

<u>ELEV.(FT.)</u>	<u>WEIR OUTFLOW</u>	<u>ORIFICE OUTFLOW</u>	<u>H</u>	<u>STORAGE</u>
105.50	0	0	0	0
106.00	31.82	190.64	0.5	52799
107.00	165.34	330.24	1.5	166132
108.00	355.76	426.28	2.5	290087
109.00	589.31	504.45	3.5	425615
110.00	859.13	571.91	4.5	573722
111.00	1160.88	632.36	5.5	735769
112.00	1491.46	687.35	6.5	913210

$$Q = C_W \times L \times H^{1.5}$$

$$Q = C \times A \times (2g \times H)^{.5}$$

<u>ELEV.(FT.)</u>	<u>WEIR OUTFLOW</u>	<u>ORIFICE OUTFLOW</u>	<u>CULVERT</u>
105.50	0	0	0
106.00	31.82	190.64	350.94
107.00	165.34	330.24	364.49
108.00	355.76	426.28	377.65
109.00	589.31	504.45	390.32
110.00	859.13	571.91	402.64
111.00	1160.88	632.36	414.57
112.00	1491.46	687.35	426.13

100-YEAR

EXECUTED: 05-08-2002 10:40:25

Return Freq: 100 years

Inflow Hydrograph: P:\PROJECTS\99-33-07\POND\100YRIN .HYD

Rating Table file: P:\PROJECTS\99-33-07\POND\FDURS100. PND

-----INITIAL CONDITIONS-----

Elevation = 105.50 ft

Outflow = 0.00 cfs

Storage = 0 cu-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
105.50	0.0	0
106.00	31.8	52,799
107.00	165.3	166,132
108.00	355.8	290,087
109.00	390.3	425,615
110.00	402.6	573,722
111.00	414.6	735,769
112.00	426.1	913,210

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + 0 (cfs)
0.0	0.0
352.0	383.8
1107.5	1272.9
1933.9	2289.7
2837.4	3227.8
3824.8	4227.5
4905.1	5319.7
6088.1	6514.2

Time Increment (t) = 5.0 min.

Inflow Hydrograph: P:\PROJECTS\99-33-07\POND\100YRIN .HYD
 Outflow Hydrograph: P:\PROJECTS\99-33-07\POND\100YR .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	105.50
5.0	358.75	358.8	299.3	358.8	29.74	105.97
10.0	789.64	1148.4	1051.5	1447.7	198.07	107.17
15.0	630.74	1420.4	1746.9	2471.9	362.47	108.19
20.0	432.84	1063.6	2060.6	2810.5	374.95	108.56
25.0	341.20	774.0	2083.0	2834.7	375.84	108.58
30.0	278.81	620.0	1961.0	2703.0	370.99	108.44
35.0	236.89	515.7	1751.4	2476.7	362.65	108.20
40.0	211.55	448.4	1522.0	2199.9	338.94	107.91
45.0	188.15	399.7	1348.0	1921.7	286.84	107.64
50.0	173.53	361.7	1215.4	1709.7	247.14	107.43
55.0	162.80	336.3	1116.6	1551.7	217.56	107.27
60.0	154.03	316.8	1042.6	1433.4	195.41	107.16
65.0	141.36	295.4	982.9	1338.0	177.54	107.06
70.0	128.68	270.0	928.3	1253.0	162.35	106.98
75.0	116.01	244.7	872.3	1173.0	150.33	106.89
80.0	102.36	218.4	814.7	1090.7	137.97	106.80
85.0	89.69	192.1	756.0	1006.8	125.37	106.70
90.0	77.01	166.7	697.2	922.7	112.75	106.61
95.0	64.34	141.4	638.3	838.6	100.11	106.51
100.0	51.67	116.0	579.4	754.3	87.47	106.42
105.0	38.99	90.7	520.5	670.1	74.81	106.32
110.0	25.35	64.3	460.8	584.8	62.00	106.23
115.0	12.67	38.0	400.6	498.8	49.09	106.13
120.0	0.00	12.7	340.8	413.3	36.25	106.03

***** SUMMARY OF ROUTING COMPUTATIONS *****

Pond File: P:\PROJECTS\99-33-07\POND\FOURS100.PND
 Inflow Hydrograph: P:\PROJECTS\99-33-07\POND\100YRIN .HYD
 Outflow Hydrograph: P:\PROJECTS\99-33-07\POND\100YR .HYD

Starting Pond W. S. Elevation = 105.50 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 789.64 cfs
 Peak Outflow = 375.84 cfs
 Peak Elevation = 108.58 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0 cu-ft
 Peak Storage From Storm = 368,825 cu-ft
 Total Storage in Pond = 368,825 cu-ft

SECTION IV

TR-55

2H6V1186

Quick TR-55 Ver.5.46 S/N:
 Executed: 10:57:16 04-19-2000
 \projects\99-33\~current\swm\qtr55\I95TRANS.TCT

TRANSPORT THROUGH CHANNEL CONNECTING OUTLET
 OF WS1 AND OUTLET OF WS4

Tt COMPUTATIONS FOR: I95 + WS1

SHEET FLOW (Applicable to Tc only)

Segment ID			
Surface description			
Manning's roughness coeff., n		0.0000	
Flow length, L (total < or = 300)	ft	0.0	
Two-yr 24-hr rainfall, P2	in	0.000	
Land slope, s	ft/ft	0.0000	
	0.8		
	.007 * (n*L)		
T =	-----	hrs	0.00 = 0.00
	0.5 0.4		
	P2 * s		

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?			
Flow length, L	ft	0.0	
Watercourse slope, s	ft/ft	0.0000	
	0.5		
Avg.V =	Csf * (s)	ft/s	0.0000
where:	Unpaved Csf = 16.1345		
	Paved Csf = 20.3282		
T = L / (3600*V)		hrs	0.00 = 0.00

CHANNEL FLOW

Segment ID		6-AB	
Cross Sectional Flow Area, a	sq.ft	3.00	
Wetted perimeter, Pw	ft	5.00	
Hydraulic radius, r = a/Pw	ft	0.600	
Channel slope, s	ft/ft	0.0310	
Manning's roughness coeff., n		0.0350	
	2/3 1/2		
	1.49 * r * s		
V =	-----	ft/s	5.3321
	n		
Flow length, L	ft	160	
T = L / (3600*V)		hrs	0.01 = 0.01

.....
 TOTAL TIME (hrs) 0.01

2H6V1187

Quick TR-55 Ver.5.46 S/N:
Executed: 10:57:16 04-19-2000
\\projects\99-33\~current\swm\qtr55\I95TRANS.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

TRANSPORT THROUGH CHANNEL CONNECTING OUTLET
OF WS1 AND OUTLET OF WS4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
I95 + WS1	Tt	0.01

2H6V1188

Quick TR-55 Ver.5.46 S/N:
 Executed: 10:55:27 04-19-2000
 \projects\99-33\~current\swm\qtr55\DD1PRE.TCT

PRE - DEVELOPMENT WATERSHED 1

Tc COMPUTATIONS FOR: WATERSHED 1

SHEET FLOW (Applicable to Tc only)

Segment ID	1-AB	
Surface description	WOODED	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	3.400
Land slope, s	ft/ft	0.0300
	0.8	
$T = \frac{.007 * (n * L)}{0.5 * P2}$	hrs	0.30 = 0.30

SHALLOW CONCENTRATED FLOW

Segment ID	1-BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	490.0
Watercourse slope, s	ft/ft	0.0530
	0.5	
Avg. V = Csf * (s)	ft/s	3.7144
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
$T = L / (3600 * V)$	hrs	0.04 = 0.04

CHANNEL FLOW

Segment ID	1-CD	1-DE
Cross Sectional Flow Area, a	sq.ft	0.17 0.33
Wetted perimeter, Pw	ft	1.17 1.67
Hydraulic radius, r = a/Pw	ft	0.143 0.200
Channel slope, s	ft/ft	0.0380 0.0200
Manning's roughness coeff., n		0.0630 0.0460
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	1.2590 1.5669
Flow length, L	ft	1920 2000
$T = L / (3600 * V)$	hrs	0.42 + 0.35 = 0.78

.....
 TOTAL TIME (hrs) 1.11

Quick TR-55 Ver.5.46 S/N:
Executed: 10:55:27 04-19-2000
\\projects\99-33\~current\swm\qtr55\DD1PRE.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

PRE - DEVELOPMENT WATERSHED 1

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
WATERSHED 1	Tc	1.11

2H6V1190

Quick TR-55 Ver.5.46 S/N:
 Executed: 10:56:59 04-19-2000
 \projects\99-33\~current\swm\qtr55\I95.TCT

I95 RUNOFF

Tc COMPUTATIONS FOR: I95 RUNOFF

SHEET FLOW (Applicable to Tc only)

Segment ID	5-AB	
Surface description	WOODED	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	3.400
Land slope, s	ft/ft	0.0200
	0.8	
$.007 * (n * L)$		
T = $\frac{0.5}{P2 * s}$	hrs	0.35 = 0.35

SHALLOW CONCENTRATED FLOW

Segment ID	5-BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	570.0
Watercourse slope, s	ft/ft	0.0700
	0.5	
Avg.V = Csf * (s)	ft/s	4.2688
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
T = L / (3600 * V)	hrs	0.04 = 0.04

CHANNEL FLOW

Segment ID	5-CD	
Cross Sectional Flow Area, a	sq.ft	0.75
Wetted perimeter, Pw	ft	2.50
Hydraulic radius, r = a/Pw	ft	0.300
Channel slope, s	ft/ft	0.0290
Manning's roughness coeff., n		0.0350
	$\frac{2}{3}$	$\frac{1}{2}$
V = $\frac{1.49 * r * s}{n}$	ft/s	3.2489
Flow length, L	ft	2810
T = L / (3600 * V)	hrs	0.24 = 0.24

.....
 TOTAL TIME (hrs) 0.62

Quick TR-55 Ver.5.46 S/N:
Executed: 10:56:59 04-19-2000
\projects\99-33\~current\swm\qtr55\I95.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

I95 RUNOFF

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
I95 RUNOFF	Tc	0.62

Quick TR-55 Ver.5.46 S/N:
 Executed: 10:54:51 04-19-2000
 ::\projects\99-33\~current\swm\qtr55\PRE.TCT

PRE DEVELOPMENT WATERSHED 4

Tc COMPUTATIONS FOR: SUB AREA 1

SHEET FLOW (Applicable to Tc only)

Segment ID	AB		
Surface description	WOODED		
Manning's roughness coeff., n	0.4000		
Flow length, L (total < or = 300)	ft	100.0	
Two-yr 24-hr rainfall, P2	in	3.400	
Land slope, s	ft/ft	0.0550	
	0.8		
	.007 * (n*L)		
T =	hrs	0.23	= 0.23
	0.5	0.4	
	P2 * s		

SHALLOW CONCENTRATED FLOW

Segment ID	BC	CD	
Surface (paved or unpaved)?	Unpaved	Unpaved	
Flow length, L	ft	1360.0	1740.0
Watercourse slope, s	ft/ft	0.0401	0.0207
	0.5		
Avg.V = Csf * (s)	ft/s	3.2309	2.3214
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.12	+ 0.21 = 0.33

CHANNEL FLOW

Segment ID	DE	EF	
Cross Sectional Flow Area, a	sq.ft	1.50	3.00
Wetted perimeter, Pw	ft	4.00	5.00
Hydraulic radius, r = a/Pw	ft	0.375	0.600
Channel slope, s	ft/ft	0.0161	0.0141
Manning's roughness coeff., n		0.0630	0.0350
	2/3	1/2	
	1.49 * r	* s	
V =	ft/s	1.5606	3.5961
	n		
Flow length, L	ft	620	850
T = L / (3600*V)	hrs	0.11	+ 0.07 = 0.18

.....
 TOTAL TIME (hrs) 0.73

2H6V1193

Quick TR-55 Ver.5.46 S/N:
Executed: 10:54:51 04-19-2000
\\projects\99-33\~current\swm\gtr55\PRE.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

PRE DEVELOPMENT WATERSHED 4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
SUB AREA 1	Tc	0.73

2H6V1194

Quick TR-55 Ver.5.46 S/N:
 Executed: 10:56:04 04-19-2000
 \projects\99-33\~current\swm\qtr55\DD4PREPP.TCT

PRE - DEVELOPMENT WATERSHED 4

Tc COMPUTATIONS FOR: SUB AREA 2

SHEET FLOW (Applicable to Tc only)

Segment ID	4-AB	
Surface description	WOODED	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	3.400
Land slope, s	ft/ft	0.0200
	0.8	
$.007 * (n * L)$		
T =	hrs	0.35
		= 0.35
	0.5	0.4
	P2	* s

SHALLOW CONCENTRATED FLOW

Segment ID	4-BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	1080.0
Watercourse slope, s	ft/ft	0.0540
	0.5	
Avg. V =	Csf * (s)	ft/s 3.7493
where:	Unpaved Csf = 16.1345	
	Paved Csf = 20.3282	
T = L / (3600 * V)	hrs	0.08
		= 0.08

CHANNEL FLOW

Segment ID	4-CD	4-DE	
Cross Sectional Flow Area, a	sq.ft	0.17	2.00
Wetted perimeter, Pw	ft	1.17	4.00
Hydraulic radius, r = a/Pw	ft	0.143	0.500
Channel slope, s	ft/ft	0.0500	0.0150
Manning's roughness coeff., n		0.0390	0.0650
	$\frac{2}{3}$	$\frac{1}{2}$	
V =	$\frac{1.49 * r^{\frac{2}{3}} * s^{\frac{1}{2}}}{n}$	ft/s	2.3330 1.7686
Flow length, L	ft	600	2840
T = L / (3600 * V)	hrs	0.07	+ 0.45 = 0.52

.....
 TOTAL TIME (hrs) 0.94

Quick TR-55 Ver.5.46 S/N:
Executed: 10:56:04 04-19-2000
\\projects\99-31\~current\swm\qtr55\DD4PREP.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

PRE - DEVELOPMENT WATERSHED 4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
SUB AREA 2	Tc	0.94

2H6V1196

Quick TR-55 Ver.5.46 S/N:
Executed: 13:53:26 04-19-2000

PRE - DEVELOPMENT
WATERSHED 1

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
WETLAND OFFSITE	1.32	61
WETLANDS ONSITE	1.42	61
BRUSH OFFSITE	1.75	68
BRUSH ONSITE	3.20	69
RES RM-2 OFFSIT	37.04	85
WOODS ONSITE	55.85	59

100.58

CN = 69.1

2H6V1197

Quick TR-55 Ver.5.46 S/N:
Executed: 13:53:26 04-19-2000

PRE - DEVELOPMENT
WATERSHED 1

RUNOFF CURVE NUMBER DATA

.....

Composite Area: WETLAND OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.25	60
SOIL C	0.07	73
COMPOSITE AREA --->	1.32	60.7 (61)

.....

Composite Area: WETLANDS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.35	60
SOIL C	0.07	73
COMPOSITE AREA --->	1.42	60.6 (61)

.....

Composite Area: BRUSH OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.61	67
SOIL C	0.14	77
COMPOSITE AREA --->	1.75	67.8 (68)

.....

2H6V1198

Quick TR-55 Ver.5.46 S/N:
Executed: 13:53:26 04-19-2000

Composite Area: BRUSH ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	2.43	67
SOIL C	0.77	77
COMPOSITE AREA --->	3.20	69.4 (69)

Composite Area: RES RM-2 OFFSIT

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	34.80	85
SOIL C	2.24	90
COMPOSITE AREA --->	37.04	85.3 (85)

Composite Area: WOODS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	40.04	55
SOIL C	15.81	70
COMPOSITE AREA --->	55.85	59.2 (59)

2H6V1199

Quick TR-55 Ver.5.46 S/N:
Executed: 15:38:54 05-03-2000

PRE - DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description -----	Area (acres) -----	CN (weighted) -----
POND 4	162.96	61

2H6V1200

Quick TR-55 Ver.5.46 S/N:
Executed: 15:38:54 05-03-2000

PRE - DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER DATA

Composite Area: POND 4

SURFACE DESCRIPTION	AREA (acres)	CN
WETLANDS OFFSITE	0.02	71
WETLANDS ONSITE	5.73	75
BRUSH ONSITE	2.80	68
WOODS OFFSITE	39.82	56
WOODS ONSITE	99.63	58
ROAD W/ROW OFFSITE	8.11	90
COMMERCIAL/BUSINESS OFFSITE	5.66	93
RESIDENTIAL 1/2AC OFFSITE	1.19	70
COMPOSITE AREA --->	162.96	61.2 (61)

2H6V1201

Quick TR-55 Ver.5.46 S/N:
Executed: 13:54:05 04-19-2000

PRE - DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
WETLAND OFFSITE	0.02	71
WETLANDS ONSITE	5.73	75
BRUSH ONSITE	2.80	68
WOODS OFFSITE	39.82	56
WOODS ONSITE	99.63	58
ROAD+RW OFFSITE	-8.11	90
COM/BUS OFFSITE	5.66	93
RES 1/2AC OFFSI	1.19	70

PRE - DEVELOPMENT WATERSHED 4
 SUBAREA 1

RUNOFF CURVE NUMBER DATA

Composite Area: WETLAND OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	0.00	60	
SOIL C	0.01	73	
COMPOSITE AREA --->	0.02	70.7	(71)

Composite Area: WETLANDS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	0.94	60	
SOIL C	1.06	73	
SOIL D	3.73	79	
COMPOSITE AREA --->	5.73	74.8	(75)

Composite Area: BRUSH ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	2.47	67	
SOIL C	0.31	77	
SOIL D	0.02	83	
COMPOSITE AREA --->	2.80	68.2	(68)

Quick TR-55 Ver.5.46 S/N:
 Executed: 13:54:05 04-19-2000

Composite Area: WOODS OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	36.99	55	
SOIL C	2.83	70	
COMPOSITE AREA --->	39.82	56.1	(56)
.....			

Composite Area: WOODS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	81.02	55	
SOIL C	14.56	70	
SOIL D	4.06	77	
COMPOSITE AREA --->	99.63	58.1	(58)
.....			

Composite Area: ROAD+RW OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	6.61	89	
SOIL C	1.51	92	
COMPOSITE AREA --->	8.11	89.6	(90)
.....			

Composite Area: COM/BUS OFFSITE

2H6V1204

SURFACE DESCRIPTION	AREA (acres)	CN	
SOIL B	2.86	92	
SOIL C	2.81	94	
COMPOSITE AREA --->	5.66	93.0	(93)
.....			

Quick TR-55 Ver.5.46 S/M:
Executed: 13:54:05 04-19-2000

Composite Area: RES 1/2AC OFFSI

SURFACE DESCRIPTION	AREA (acres)	CN
-----	-----	-----
SOIL B	1.19	70
COMPOSITE AREA --->	1.19	70.0 (70)
.....		

2H6V1205

Quick TR-55 Ver.5.46 S/N:
Executed: 10:47:40 04-21-2000

PRE - DEVELOPMENT WATERSHED 4
SUBAREA 2

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
WETLAND OFFSITE	10.71	77
WETLANDS ONSITE	3.53	78
BRUSH ONSITE	10.64	67
BRUSH OFFSITE	1.06	68
WOODS ONSITE	38.78	55
ROAD+RW OFFSITE	11.39	90
COM/BUS OFFSITE	50.74	92
RES 1/2AC OFFSI	18.41	70

2H6V1206

Quick TR-55 Ver.5.46 S/N:
Executed: 10:47:40 04-21-2000

PRE - DEVELOPMENT WATERSHED 4
SUBAREA 2

RUNOFF CURVE NUMBER DATA

Composite Area: WETLAND OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.09	60
SOIL C	0.30	73
SOIL D	9.32	79
COMPOSITE AREA --->	10.71	76.9 (77)

Composite Area: WETLANDS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.15	60
SOIL D	3.38	79
COMPOSITE AREA --->	3.53	78.2 (78)

Composite Area: BRUSH ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	10.41	67
SOIL D	0.23	83
COMPOSITE AREA --->	10.64	67.3 (67)

2H6V1207

Quick TR-55 Ver.5.46 S/N:
Executed: 10:47:40 04-21-2000

Composite Area: BRUSH OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.96	67
SOIL C	0.10	77
COMPOSITE AREA --->	1.06	67.9 (68)

Composite Area: WOODS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	38.38	55
SOIL C	0.18	70
SOIL D	0.22	77
COMPOSITE AREA --->	38.78	55.2 (55)

Composite Area: ROAD+RW OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	7.78	89
SOIL C	1.77	92
SOIL D	1.84	93
COMPOSITE AREA --->	11.39	90.1 (90)

Composite Area: COM/BUS OFFSITE

2H6V1208

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	39.04	92
SOIL C	11.13	94
SOIL D	0.57	95

Quick TR-55 Ver.5.46 S/N:
Executed: 10:47:40 04-21-2000

Composite Area: RES 1/2AC OFFSI

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	18.17	70
SOIL C	0.01	80
SOIL D	0.23	85
COMPOSITE AREA --->	18.41	70.2 (70)

.....

2H6V1210

Quick TR-55 Ver.5.46 S/N:
Executed: 11:29:10 04-21-2000

RUNOFF CHanneled ONTO PROPERTY BY WAY OF
A CULVERT UNDER I95

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
I95 RUNOFF	46.35	90

2H6V1211

Quick TR-55 Ver.5.46 S/N:
Executed: 11:29:10 04-21-2000

RUNOFF CHANNELED ONTO PROPERTY BY WAY OF
A CULVERT UNDER I95

RUNOFF CURVE NUMBER DATA

.....

Composite Area: I95 RUNOFF

SURFACE DESCRIPTION	AREA (acres)	CN
SR-6	0.96	85
SOIL B M-2	16.74	85
BRUSH SOIL B	0.57	89
ROADWAY SOIL D	26.35	93
ROADWAY SOIL B	1.73	89
COMPOSITE AREA --->	46.35	89.7 (90)

.....

2H6V1212

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:16:06

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
WATERSHED 1	100.58	69.0	1.00	0.00	7.80	4.18	.12 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 100.58 acres or 0.1572 sq.mi

Peak discharge = 235 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p Interpolated (Yes/No)	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)		
WATERSHED 1	1.11	0.00	1.00	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

2H6V1213

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:16:06

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
----- WATERSHED 1 -----	----- 235 -----	----- 12.8 -----
Composite Watershed	235	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:16:06

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
WATERSHED 1	7	10	13	19	23	31	47	74	110
Total (cfs)	7	10	13	19	23	31	47	74	110

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
WATERSHED 1	152	190	216	235	206	157	115	87	68
Total (cfs)	152	190	216	235	206	157	115	87	68

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
WATERSHED 1	55	41	33	26	22	19	17	15	14
Total (cfs)	55	41	33	26	22	19	17	15	14

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
WATERSHED 1	13	11	10	8	0
Total (cfs)	13	11	10	8	0

2H6V1215

TR-55 TABULAR HYDROGRAPH METHOD
 Type II Distribution
 (24 hr. Duration Storm)

Executed: 05-04-2000 08:16:06

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

2H6V1216

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	7	14.8	30
11.1	8	14.9	28
11.2	9	15.0	26
11.3	10	15.1	25
11.4	11	15.2	24
11.5	12	15.3	24
11.6	13	15.4	23
11.7	15	15.5	22
11.8	17	15.6	21
11.9	19	15.7	21
12.0	23	15.8	20
12.1	31	15.9	20
12.2	47	16.0	19
12.3	74	16.1	19
12.4	110	16.2	18
12.5	152	16.3	18
12.6	190	16.4	17
12.7	216	16.5	17
12.8	235	16.6	17
12.9	220	16.7	16
13.0	206	16.8	16
13.1	182	16.9	15
13.2	157	17.0	15
13.3	136	17.1	15
13.4	115	17.2	15
13.5	101	17.3	14
13.6	87	17.4	14
13.7	77	17.5	14
13.8	68	17.6	14
13.9	61	17.7	14
14.0	55	17.8	13
14.1	50	17.9	13
14.2	46	18.0	13
14.3	41	18.1	13
14.4	38	18.2	12

14.5
14.6
14.7

36
33
31

18.3
18.4
18.5

12
12
12

2H6V1217

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:16:06

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD1 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

2H6V1218

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	12	22.4	7
18.7	12	22.5	7
18.8	11	22.6	7
18.9	11	22.7	7
19.0	11	22.8	6
19.1	11	22.9	6
19.2	11	23.0	6
19.3	11	23.1	6
19.4	11	23.2	6
19.5	10	23.3	5
19.6	10	23.4	5
19.7	10	23.5	5
19.8	10	23.6	5
19.9	10	23.7	5
20.0	10	23.8	4
20.1	10	23.9	4
20.2	10	24.0	4
20.3	10	24.1	4
20.4	10	24.2	4
20.5	10	24.3	3
20.6	9	24.4	3
20.7	9	24.5	3
20.8	9	24.6	3
20.9	9	24.7	3
21.0	9	24.8	2
21.1	9	24.9	2
21.2	9	25.0	2
21.3	9	25.1	2
21.4	9	25.2	2
21.5	8	25.3	1
21.6	8	25.4	1
21.7	8	25.5	1
21.8	8	25.6	1
21.9	8	25.7	1
22.0	8	25.8	0
22.1	8	25.9	

22.3

7

2H6V1219

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 10:02:09

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 4 SUBAREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
FLW UPSTM POND4	162.96	61.0	0.75	0.75	7.80	3.29	.16 .10
FLW DNSTM POND4	145.26	76.0	1.00	0.00	7.80	4.98	.08 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 308.22 acres or 0.4816 sq.mi

Peak discharge = 547 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p Interpolated	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	(Yes/No)	
FLW UPSTM POND4	0.73	0.66	0.75	0.75	No	--
FLW DNSTM POND4	0.94	0.00	1.00	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

2H6V1220

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 10:02:09

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 4 SUBAREA 2

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
FLW UPSTM POND4	276	13.4
FLW DNSTM POND4	404	12.8
Composite Watershed	547	13.0

2H6V1221

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 10:02:09

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 4 SUBAREA 2

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
FLW UPSTM POND4	7	8	11	14	15	18	19	22	26
FLW DNSTM POND4	12	17	23	33	40	53	81	127	190
Total (cfs)	19	25	34	47	55	71	100	149	216

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
FLW UPSTM POND4	33	46	69	102	193	263	276	235	182
FLW DNSTM POND4	261	327	372	404	354	270	198	150	116
Total (cfs)	294	373	441	506	547	533	474	385	298

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
FLW UPSTM POND4	135	87	60	43	32	28	24	22	19
FLW DNSTM POND4	94	71	57	45	37	33	29	26	24
Total (cfs)	229	158	117	88	69	61	53	48	43

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
LW UPSTM POND4	18	16	13	10	1
LW DNSTM POND4	23	19	17	14	0

2H6V1222

Total (cfs) 41 35 30 24 1

2H6V1223

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 10:02:09

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 4 SUBAREA 2

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	19	14.8	102
11.1	21	14.9	95
11.2	23	15.0	88
11.3	25	15.1	84
11.4	28	15.2	80
11.5	31	15.3	77
11.6	34	15.4	73
11.7	38	15.5	69
11.8	43	15.6	67
11.9	47	15.7	66
12.0	55	15.8	64
12.1	71	15.9	63
12.2	100	16.0	61
12.3	149	16.1	59
12.4	216	16.2	58
12.5	294	16.3	56
12.6	373	16.4	55
12.7	441	16.5	53
12.8	506	16.6	52
12.9	526	16.7	51
13.0	547	16.8	50
13.1	540	16.9	49
13.2	533	17.0	48
13.3	504	17.1	47
13.4	474	17.2	46
13.5	430	17.3	45
13.6	385	17.4	44
13.7	342	17.5	43
13.8	298	17.6	43
13.9	264	17.7	42
14.0	229	17.8	42
14.1	205	17.9	41
14.2	182	18.0	41
14.3	158	18.1	40
14.4	144	18.2	40

14.5
14.6
14.7

131
117
110

18.3
18.4
18.5

39
39
38

2H6V1225

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 10:02:09

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PREDD4 .HYD

PRE-DEVELOPMENT HYDROGRAPH FOR WATERSHED 4 SUBAREA 2

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	37	22.4	22
18.7	37	22.5	21
18.8	36	22.6	21
18.9	36	22.7	20
19.0	35	22.8	19
19.1	34	22.9	19
19.2	34	23.0	18
19.3	34	23.1	18
19.4	33	23.2	17
19.5	32	23.3	17
19.6	32	23.4	16
19.7	32	23.5	15
19.8	31	23.6	15
19.9	30	23.7	14
20.0	30	23.8	14
20.1	30	23.9	13
20.2	29	24.0	12
20.3	29	24.1	12
20.4	29	24.2	11
20.5	28	24.3	11
20.6	28	24.4	10
20.7	28	24.5	10
20.8	28	24.6	9
20.9	27	24.7	8
21.0	27	24.8	8
21.1	27	24.9	7
21.2	26	25.0	7
21.3	26	25.1	6
21.4	26	25.2	6
21.5	26	25.3	5
21.6	25	25.4	4
21.7	25	25.5	4
21.8	25	25.6	3
21.9	24	25.7	3
22.0	24	25.8	2
22.1	23	25.9	2
22.2	23		

2H6V1226

2H6V1227

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:20

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1-I95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1AI95.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR FLOW TRAVELING IN CHANNEL WHICH
RUNS BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
WATERSHED 1	100.58	69.0	1.00	0.00	7.80	4.18	.12 .10
I95	46.35	90.0	0.50	0.00	7.80	6.61	.03 .10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 146.93 acres or 0.2296 sq.mi
Peak discharge = 395 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	Interpolated (Yes/No)	
WATERSHED 1	1.11	0.00	1.00	0.00	No	--
I95	0.62	0.00	0.50	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

2H6V1228

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:20

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1-I95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1AI95.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR FLOW TRAVELING IN CHANNEL WHICH
RUNS BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
-----	-----	-----
WATERSHED 1	235	12.8
I95	253	12.4
-----	-----	-----
Composite Watershed	395	12.5

2H6V1229

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:20

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1-I95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1AI95.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR FLOW TRAVELING IN CHANNEL WHICH
RUNS BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
WATERSHED 1	7	10	13	19	23	31	47	74	110
I95	8	11	15	27	45	81	147	224	253
Total (cfs)	15	21	28	46	68	112	194	298	363

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
WATERSHED 1	152	190	216	235	206	157	115	87	68
I95	243	192	142	108	67	46	35	29	25
otal (cfs)	395	382	358	343	273	203	150	116	93

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
WATERSHED 1	55	41	33	26	22	19	17	15	14
I95	22	20	17	15	14	12	11	10	10
tal (cfs)	77	61	50	41	36	31	28	25	24

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
WATERSHED 1	13	11	10	8	0
I95	9	8	7	6	0

2H6V1230

Total (cfs) 22 19 17 14 0

2H6V1231

TR-55 TABULAR HYDROGRAPH METHOD
 Type II Distribution
 (24 hr. Duration Storm)

Executed: 05-04-2000 08:19:20

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1-I95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1AI95.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR FLOW TRAVELING IN CHANNEL WHICH
 RUNS BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	15	14.8	46
11.1	17	14.9	43
11.2	19	15.0	41
11.3	21	15.1	40
11.4	23	15.2	39
11.5	26	15.3	38
11.6	28	15.4	37
11.7	34	15.5	36
11.8	40	15.6	35
11.9	46	15.7	34
12.0	68	15.8	33
12.1	112	15.9	32
12.2	194	16.0	31
12.3	298	16.1	30
12.4	363	16.2	30
12.5	395	16.3	29
12.6	382	16.4	29
12.7	358	16.5	28
12.8	343	16.6	27
12.9	308	16.7	27
13.0	273	16.8	26
13.1	238	16.9	26
13.2	203	17.0	25
13.3	176	17.1	25
13.4	150	17.2	25
13.5	133	17.3	24
13.6	116	17.4	24
13.7	104	17.5	24
13.8	93	17.6	24
13.9	85	17.7	23
14.0	77	17.8	23
14.1	72	17.9	22
14.2	66	18.0	22
14.3	61	18.1	22
14.4	57	18.2	21

14.5
14.6
14.7

54
50
48

18.3
18.4
18.5

21
21
20

2H6V1233

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:20

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1-I95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PRE1AI95.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR FLOW TRAVELING IN CHANNEL WHICH
RUNS BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	20	22.4	13
18.7	20	22.5	12
18.8	20	22.6	12
18.9	19	22.7	12
19.0	19	22.8	11
19.1	19	22.9	11
19.2	19	23.0	10
19.3	18	23.1	10
19.4	18	23.2	10
19.5	18	23.3	9
19.6	18	23.4	9
19.7	18	23.5	9
19.8	17	23.6	8
19.9	17	23.7	8
20.0	17	23.8	8
20.1	17	23.9	7
20.2	17	24.0	7
20.3	17	24.1	7
20.4	16	24.2	6
20.5	16	24.3	6
20.6	16	24.4	6
20.7	16	24.5	5
20.8	16	24.6	5
20.9	16	24.7	5
21.0	16	24.8	4
21.1	15	24.9	4
21.2	15	25.0	4
21.3	15	25.1	3
21.4	15	25.2	3
21.5	15	25.3	2
21.6	15	25.4	2
21.7	14	25.5	2
21.8	14	25.6	1
21.9	14	25.7	1
22.0	14	25.8	1
22.1	14	25.9	0
22.2	13		

2H6V1234

22.3

13

2H6V1235

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 04-21-2000 11:53:05

Watershed file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.WSD

Hydrograph file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING OFF PROPERTY
THROUGH DOUBLE BOX CULVERT UNDER I95

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
FLW UPSTM POND4	162.96	61.0	0.75	0.75	7.80	3.29	.16 .10
FLW DNSTM POND4	145.26	76.0	1.00	0.00	7.80	4.98	.08 .10
FLW FROM DD 1	100.58	69.0	1.00	0.10	7.80	4.18	.12 .10
FLOW FROM I95	46.35	90.0	0.50	0.10	7.80	6.61	.03 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 455.15 acres or 0.7112 sq.mi

Peak discharge = 848 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p Interpolated	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	(Yes/No)	
FLW UPSTM POND4	0.73	0.66	0.75	0.75	No	--
FLW DNSTM POND4	0.94	0.00	1.00	0.00	No	Computed Ia/p < .1
FLW FROM DD 1	1.11	0.01	1.00	0.10	No	--
FLOW FROM I95	0.62	0.01	0.50	0.10	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

2H6V1236

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 04-21-2000 11:53:05

Watershed file: -->

o:\projects\99-33\~current\swm\qtr55\PREI95TL.WSD

Hydrograph file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING OFF PROPERTY
THROUGH DOUBLE BOX CULVERT UNDER I95

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
FLW UPSTM POND4	276	13.4
FLW DNSTM POND4	404	12.8
FLW FROM DD 1	223	13.0
FLOW FROM I95	239	12.5
Composite Watershed	848	13.0

2H6V1237

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 04-21-2000 11:53:05

Watershed file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.WSD

Hydrograph file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING OFF PROPERTY
THROUGH DOUBLE BOX CULVERT UNDER I95

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
UPSTM POND4	7	8	11	14	15	18	19	22	26
DNSTM POND4	12	17	23	33	40	53	81	127	190
FROM DD 1	7	9	11	16	18	22	28	41	62
FROM I95	-8	11	14	24	38	67	121	189	232
al (cfs)	34	45	59	87	111	160	249	379	510

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
UPSTM POND4	33	46	69	102	193	263	276	235	182
DNSTM POND4	261	327	372	404	354	270	198	150	116
FROM DD 1	95	133	171	201	223	192	146	108	83
FROM I95	239	208	164	127	78	52	38	31	26
total (cfs)	628	714	776	834	848	777	658	524	407

2H6V1238

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 04-21-2000 11:53:05

Watershed file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.WSD

Hydrograph file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING OFF PROPERTY
THROUGH DOUBLE BOX CULVERT UNDER I95

Composite Hydrograph Summary (cfs)

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
FLW UPSTM POND4	135	87	60	43	32	28	24	22	19
FLW DNSTM POND4	94	71	57	45	37	33	29	26	24
FLW FROM DD 1	64	47	37	28	23	20	18	16	14
FLW FROM I95	23	20	17	16	14	12	11	10	10
Total (cfs)	316	225	171	132	106	93	82	74	67

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
FLW UPSTM POND4	18	16	13	10	1
FLW DNSTM POND4	23	19	17	14	0
FLW FROM DD 1	13	12	10	8	0
FLW FROM I95	9	8	7	6	0
Total (cfs)	63	55	47	38	1

2H6V1239

TR-55 TABULAR HYDROGRAPH METHOD
 Type II Distribution
 (24 hr. Duration Storm)

Executed: 04-21-2000 11:53:05

Watershed file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.WSD

Hydrograph file: -->

:\projects\99-33\~current\swm\qtr55\PREI95TL.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING OFF PROPERTY
 THROUGH DOUBLE BOX CULVERT UNDER I95

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	34	14.8	152
11.1	38	14.9	142
11.2	41	15.0	132
11.3	45	15.1	127
11.4	50	15.2	122
11.5	54	15.3	116
11.6	59	15.4	111
11.7	68	15.5	106
11.8	78	15.6	103
11.9	87	15.7	101
12.0	111	15.8	98
12.1	160	15.9	96
12.2	249	16.0	93
12.3	379	16.1	91
12.4	510	16.2	89
12.5	628	16.3	86
12.6	714	16.4	84
12.7	776	16.5	82
12.8	834	16.6	80
12.9	841	16.7	79
13.0	848	16.8	77
13.1	812	16.9	76
13.2	777	17.0	74
13.3	717	17.1	73
13.4	658	17.2	71
13.5	591	17.3	70
13.6	524	17.4	68
13.7	465	17.5	67
13.8	407	17.6	66
13.9	362	17.7	65
14.0	316	17.8	65
14.1	286	17.9	64
14.2	255	18.0	63
14.3	225	18.1	62
14.4	207	18.2	61

14.5	189	18.3	61
14.6	171	18.4	60
14.7	161	18.5	59

2H6V1241

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 04-21-2000 11:53:05

Watershed file: -->

:\projects\99-33\~current\swm\qtr55\PREI95TL.WSD

Hydrograph file: -->

p:\projects\99-33\~current\swm\qtr55\PREI95TL.HYD

PRE-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING OFF PROPERTY
THROUGH DOUBLE BOX CULVERT UNDER I95

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	58	22.4	34
18.7	57	22.5	33
18.8	57	22.6	32
18.9	56	22.7	32
19.0	55	22.8	31
19.1	54	22.9	30
19.2	53	23.0	29
19.3	53	23.1	28
19.4	52	23.2	27
19.5	51	23.3	26
19.6	50	23.4	25
19.7	49	23.5	24
19.8	49	23.6	23
19.9	48	23.7	22
20.0	47	23.8	21
20.1	47	23.9	20
20.2	46	24.0	20
20.3	46	24.1	19
20.4	45	24.2	18
20.5	45	24.3	17
20.6	44	24.4	16
20.7	44	24.5	15
20.8	43	24.6	14
20.9	43	24.7	13
21.0	42	24.8	12
21.1	42	24.9	11
21.2	42	25.0	10
21.3	41	25.1	9
21.4	41	25.2	8
21.5	40	25.3	7
21.6	40	25.4	7
21.7	39	25.5	6
21.8	39	25.6	5
21.9	38	25.7	4
22.0	38	25.8	3
22.1	37	25.9	2
22.2	36		

2H6V1242

2H6V1243

Quick TR-55 Ver.5.46 S/N:
 Executed: 20:38:44 04-21-2000
 ::\projects\99-33\current\swm\qtr55\I95TRANS.TCT

TRANSPORT THROUGH CHANNEL CONNECTING OUTLET
 OF WS1 AND OUTLET OF WS4

Tt COMPUTATIONS FOR: I95 + WS1

SHEET FLOW (Applicable to Tc only)

Segment ID			
Surface description			
Manning's roughness coeff., n		0.0000	
Flow length, L (total < or = 300)	ft	0.0	
Two-yr 24-hr rainfall, P2	in	0.000	
Land slope, s	ft/ft	0.0000	
	0.8		
	.007 * (n*L)		
T =	-----	hrs	0.00 = 0.00
	0.5 0.4		
	P2 * s		

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?			
Flow length, L	ft	0.0	
Watercourse slope, s	ft/ft	0.0000	
	0.5		
Avg.V = Csf * (s)	ft/s	0.0000	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.00	= 0.00

CHANNEL FLOW

Segment ID		6-AB
Cross Sectional Flow Area, a	sq.ft	3.00
Wetted perimeter, Pw	ft	5.00
Hydraulic radius, r = a/Pw	ft	0.600
Channel slope, s	ft/ft	0.0310
Manning's roughness coeff., n		0.0350

	2/3	1/2
	1.49 * r	* s
V =	-----	
	n	
	ft/s	5.3321

Flow length, L	ft	160
----------------	----	-----

T = L / (3600*V)	hrs	0.01	= 0.01
------------------	-----	------	--------

.....
 TOTAL TIME (hrs) 0.01

2H6V1244

Quick TR-55 Ver.5.46 S/N:
Executed: 20:38:44 04-21-2000
n:\projects\99-33\~current\swm\qtr55\I95TRANS.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

TRANSPORT THROUGH CHANNEL CONNECTING OUTLET
OF WS1 AND OUTLET OF WS4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
I95 + WS1	Tt	0.01

2H6V1245

Quick TR-55 Ver.5.46 S/N:
 Executed: 10:55:45 04-19-2000
 \projects\99-33\~current\swm\qtr55\DD1POST.TCT

POST - DEVELOPMENT WATERSHED 1

Tc COMPUTATIONS FOR: WATERSHED 1

SHEET FLOW (Applicable to Tc only)

Segment ID	1-AB	
Surface description	WOODED	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	3.400
Land slope, s	ft/ft	0.1100
	0.8	
	.007 * (n*L)	
T =	hrs	0.18
		= 0.18
	0.5	0.4
	P2	* s

SHALLOW CONCENTRATED FLOW

Segment ID	1-BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	340.0
Watercourse slope, s	ft/ft	0.0410
	0.5	
Avg.V = Csf * (s)	ft/s	3.2670
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
T = L / (3600*V)	hrs	0.03
		= 0.03

CHANNEL FLOW

Segment ID	1-CD	1-DE
Cross Sectional Flow Area, a	sq.ft	0.17
Wetted perimeter, Pw	ft	1.17
Hydraulic radius, r = a/Pw	ft	0.143
Channel slope, s	ft/ft	0.0300
Manning's roughness coeff., n		0.0630
		0.0460
	2/3	1/2
	1.49	* r * s
V =	ft/s	1.1187
		1.5669
	n	
Flow length, L	ft	1520
		2000
T = L / (3600*V)	hrs	0.38
		+ 0.35
		= 0.73

.....
 TOTAL TIME (hrs) 0.94

2H6V1246

Quick TR-55 Ver. 5-46 S/N:
Executed: 10:55:45 04-19-2000
\\projects\93-33\~current\swm\qtr55\DD1POST.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

POST - DEVELOPMENT WATERSHED 1

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
WATERSHED 1	Tc	0.94

2H6V1247

Quick TR-55 Ver.5.46 S/N:
 Executed: 20:41:02 04-21-2000
 ..:\projects\99-33\~current\swm\qtr55\I95.TCT

I95 RUNOFF

Tc COMPUTATIONS FOR: I95 RUNOFF

SHEET FLOW (Applicable to Tc only)

Segment ID	5-AB	
Surface description	WOODED	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft	100.0
Two-yr 24-hr rainfall, P2	in	3.400
Land slope, s	ft/ft	0.0200
	0.8	
$T = \frac{.007 * (n * L)}{P2 * s}$		
	hrs	0.35 = 0.35

SHALLOW CONCENTRATED FLOW

Segment ID	5-BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft	570.0
Watercourse slope, s	ft/ft	0.0700
	0.5	
Avg.V = Csf * (s)	ft/s	4.2688
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
$T = L / (3600 * V)$		
	hrs	0.04 = 0.04

CHANNEL FLOW

Segment ID	5-CD	
Cross Sectional Flow Area, a	sq.ft	0.75
Wetted perimeter, Pw	ft	2.50
Hydraulic radius, r = a/Pw	ft	0.300
Channel slope, s	ft/ft	0.0290
Manning's roughness coeff., n		0.0350
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$		
	ft/s	3.2489
Flow length, L	ft	2810
$T = L / (3600 * V)$		
	hrs	0.24 = 0.24

.....
 TOTAL TIME (hrs) 0.62

2H6V1248

Quick TR-55 Ver.5-46 S/N:
Executed: 20:41:02 04-21-2000
\\projects\99-33\~current\swm\qtr55\I95.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

I95 RUNOFF

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
I95 RUNOFF	Tc	0.62

2H6V1249

Quick TR-55 Ver 5-46 S/N:
 Executed: 10:55:10 04-19-2000
 \projects\99-33\~current\swm\qtr55\POST.TCT

POST DEVELOPMENT WATERSHED 4

Tc COMPUTATIONS FOR: SUB AREA 1

SHEET FLOW (Applicable to Tc only)

Segment ID	AB		
Surface description	WOODED		
Manning's roughness coeff., n		0.4000	
Flow length, L (total < or = 300)	ft	100.0	
Two-yr 24-hr rainfall, P2	in	3.400	
Land slope, s	ft/ft	0.0550	
		0.8	
		.007 * (n*L)	
T =	hrs	0.23	= 0.23
		0.5	0.4
		P2	* s

SHALLOW CONCENTRATED FLOW

Segment ID	BC		
Surface (paved or unpaved)?	Unpaved		
Flow length, L	ft	1200.0	
Watercourse slope, s	ft/ft	0.0420	
		0.5	
Avg. V = Csf * (s)	ft/s	3.3066	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.10	= 0.10

CHANNEL FLOW

Segment ID	CD		
Cross Sectional Flow Area, a	sq.ft	50.00	
Wetted perimeter, Pw	ft	29.00	
Hydraulic radius, r = a/Pw	ft	1.724	
Channel slope, s	ft/ft	0.0240	
Manning's roughness coeff., n		0.0500	
		2/3	1/2
		1.49	* r * s
V =	ft/s	6.6380	
		n	
Flow length, L	ft	1025	
T = L / (3600*V)	hrs	0.04	= 0.04

.....
 TOTAL TIME (hrs) 0.38

2H6V1250

Quick TR-55 Ver. 3-46 S/N:
 Executed: 10:55:10 04-19-2000
 \projects\99-33\~current\swm\qtr55\POST.TCT

POST DEVELOPMENT WATERSHED 4

Tc COMPUTATIONS FOR: SUB AREA 1

SHEET FLOW (Applicable to Tc only)

Segment ID			
Surface description			
Manning's roughness coeff., n		0.0000	
Flow length, L (total < or = 300)	ft	0.0	
Two-yr 24-hr rainfall, P2	in	0.000	
Land slope, s	ft/ft	0.0000	
	0.8		
	.007 * (n*L)		
T =	-----	hrs	0.00 = 0.00
	0.5 0.4		
	P2 * s		

SHALLOW CONCENTRATED FLOW

Segment ID		DE
Surface (paved or unpaved)?		Unpaved
Flow length, L	ft	690.0
Watercourse slope, s	ft/ft	0.0145
	0.5	
Avg.V = Csf * (s)	ft/s	1.9429
where: Unpaved Csf = 16.1345		
Paved Csf = 20.3282		
T = L / (3600*V)	hrs	0.10 = 0.10

CHANNEL FLOW

Segment ID		EF	FG
Cross Sectional Flow Area, a	sq.ft	1.50	3.00
Wetted perimeter, Pw	ft	4.00	5.00
Hydraulic radius, r = a/Pw	ft	0.375	0.600
Channel slope, s	ft/ft	0.0161	0.0141
Manning's roughness coeff., n		0.0630	0.0350
	2/3 1/2		
V =	-----	ft/s	1.5606 3.5961
	1.49 * r * s		
	n		
Flow length, L	ft	620	850
T = L / (3600*V)	hrs	0.11 + 0.07 = 0.18	

.....
 TOTAL TIME (hrs) 0.27

2H6V1251

86

Quick TR-55 Ver. 5.46 S/N:
Executed: 10:55:10 04-19-2000
\\projects\99-33\~current\swm\qtr55\POST.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

POST DEVELOPMENT WATERSHED 4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
SUB AREA 1	Tc	0.38
SUB AREA 1	Tc	0.27

Quick TR-55 Ver. 5.46 S/N:
 Executed: 10:56:42 04-19-2000
 \projects\99-33\~current\swm\qtr55\JLFFPP.TCT

POST DEVELOPMENT TRAVEL TIME
 FOR WATERSHED 4

Tt COMPUTATIONS FOR: SUB AREA 1

SHEET FLOW (Applicable to Tc only)

Segment ID			
Surface description			
Manning's roughness coeff., n		0.0000	
Flow length, L (total < or = 300)	ft	0.0	
Two-yr 24-hr rainfall, P2	in	0.000	
Land slope, s	ft/ft	0.0000	
	0.8		
$T = \frac{.007 * (n * L)}{0.5 * P2 * s}$			
	hrs	0.00	= 0.00

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?			
Flow length, L	ft	0.0	
Watercourse slope, s	ft/ft	0.0000	
	0.5		
Avg.V = Csf * (s)	ft/s	0.0000	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
$T = L / (3600 * V)$			
	hrs	0.00	= 0.00

CHANNEL FLOW

Segment ID		4-TT	
Cross Sectional Flow Area, a	sq.ft	2.00	
Wetted perimeter, Pw	ft	4.00	
Hydraulic radius, r = a/Pw	ft	0.500	
Channel slope, s	ft/ft	0.0140	
Manning's roughness coeff., n		0.0650	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$			
	ft/s	1.7086	
Flow length, L	ft	4050	
$T = L / (3600 * V)$			
	hrs	0.66	= 0.66

.....
 TOTAL TIME (hrs) 0.66

Quick TR-55 Vers. 5-46 S/N:
Executed: 10:56:42 04-19-2000
\\projects\99-33\~current\swm\qtr55\JEFFPP.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

POST DEVELOPMENT TRAVEL TIME
FOR WATERSHED 4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
SUB AREA 1	Tt	0.66

2H6V1254

Quick TR-55 Ver. 5.46 S/N:
 Executed: 08:20:31 05-04-2000
 \PROJECTS\99-33\~CURRENT\SWM\QTR55\DD4PSTPP.TCT

POST - DEVELOPMENT WATERSHED 4

Tc COMPUTATIONS FOR: SUB AREA 2

SHEET FLOW (Applicable to Tc only)

Segment ID	4-AB	
Surface description	WOODED	
Manning's roughness coeff., n	0.4000	
Flow length, L (total < or = 300)	ft 100.0	
Two-yr 24-hr rainfall, P2	in 3.400	
Land slope, s	ft/ft 0.1100	
	0.8	
	.007 * (n*L)	
T =	hrs 0.18	= 0.18
	0.5 0.4	
	P2 * s	

SHALLOW CONCENTRATED FLOW

Segment ID	4-BC	
Surface (paved or unpaved)?	Unpaved	
Flow length, L	ft 120.0	
Watercourse slope, s	ft/ft 0.1580	
	0.5	
Avg. V =	Csf * (s) ft/s 6.4133	
where:	Unpaved Csf = 16.1345	
	Paved Csf = 20.3282	
T = L / (3600*V)	hrs 0.01	= 0.01

CHANNEL FLOW

Segment ID	4-CD	4-DE
Cross Sectional Flow Area, a	sq.ft 0.17	2.00
Wetted perimeter, Pw	ft 1.17	4.00
Hydraulic radius, r = a/Pw	ft 0.143	0.500
Channel slope, s	ft/ft 0.1160	0.0150
Manning's roughness coeff., n	0.0390	0.0650
	2/3 1/2	
V =	1.49 * r * s	ft/s 3.5557 1.7686
	n	
Flow length, L	ft 500	3500
T = L / (3600*V)	hrs 0.04 + 0.55	= 0.59

.....
 TOTAL TIME (hrs) 0.77

Quick TR-55 Ver. 5.46 S/N:
Executed: 08:20:31 05-04-2000
\\PROJECTS\\99-33\\~CURRENT\\SWM\\QTR55\\DD4PSTPP.TCT

SUMMARY SHEET FOR Tc or Tt COMPUTATIONS
(Solved for Time using TR-55 Methods)

POST - DEVELOPMENT WATERSHED 4

Subarea descr.	Tc or Tt	Time (hrs)
-----	-----	-----
SUB AREA 2	Tc	0.77

2H6V1256

POST - DEVELOPMENT
WATERSHED 1

RUNOFF CURVE NUMBER SUMMARY

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Subarea Description	Area (acres)	CN (weighted)
WETLAND OFFSITE	1.32	61
WETLANDS ONSITE	1.42	61
BRUSH OFFSITE	1.75	68
BRUSH ONSITE	3.20	69
RES M-2 OFFSITE	37.04	85
RES ONSITE	51.34	86
OPEN SPACE ONSI	4.09	80
WOODS ONSITE	8.73	60

Quick TR-55 Ver.5.4C S/N:
Executed: 11:07:49 04-21-2000

POST - DEVELOPMENT
WATERSHED 1

RUNOFF CURVE NUMBER DATA

Composite Area: WETLAND OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.25	60
SOIL_C	0.07	73
COMPOSITE AREA --->	1.32	60.7 (61)

Composite Area: WETLANDS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.35	60
SOIL C	0.07	73
COMPOSITE AREA --->	1.42	60.6 (61)

Composite Area: BRUSH OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.61	67
SOIL C	0.14	77
COMPOSITE AREA --->	1.75	67.8 (68)

Composite Area: BRUSH ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	2.43	67
SOIL C	0.77	77
COMPOSITE AREA --->	3.20	69.4 (69)

Composite Area: RES M-2 OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	34.80	85
SOIL C	2.24	90
COMPOSITE AREA --->	37.04	85.3 (85)

Composite Area: RES ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	41.86	85
SOIL C	9.48	90
COMPOSITE AREA --->	51.34	85.9 (86)

Composite Area: OPEN SPACE ONSI

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	3.51	79
SOIL C	0.58	86
COMPOSITE AREA --->	4.09	80.0 (80)

Quick TR-55-Ver.5.46 S/N:
Executed: 11:07:49 04-21-2000

Composite Area: WOODS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	6.07	55
SOIL C	2.66	70
COMPOSITE AREA --->	8.73	59.6 (60)

.....

2H6V1260

Quick TR=55 Ver.5.46 S/N:
Executed: 13:55:38 04-19-2000

POST - DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
POND 4	155.53	70

2H6V1261

Quick TR-55 Ver.5.46 S/N:
Executed: 13:55:38 04-19-2000

POST - DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER DATA

.....

Composite Area: POND 4

SURFACE DESCRIPTION	AREA (acres)	CN
WETLANDS OFFSITE	0.02	71
WOODS OFFSITE	39.83	56
COM.\BUS.\RES.(1/2AC.) OFFSITE	6.85	89
RT 234 +ROW, VDOT IMPROV. 234	8.11	92
WETLANDS ONSITE	5.18	76
WOODS ONSITE	30.77	58
RES1/8AC ONSITE	27.89	86
ROAD + ROW ONSITE	12.65	90
OPENSACE ONSITE	22.81	63
CLUBHOUSE ONSITE	1.42	93
COMPOSITE AREA --->	155.53	69.9 (70)

.....

2H6V1262

Quick TR-55-Ver.5.46 S/N:
Executed: 13:54:19 04-19-2000

POST- DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
WETLAND OFFSITE	0.02	71
WOODS OFFSITE	39.83	56
OFFSITE	6.85	89
ROAD+RW OFFSITE	8.11	92
WETLAND ONSITE	5.18	76
WOODS ONSITE	30.77	58
RES1/8AC ONSITE	27.89	86
ROAD+R/W ONSITE	12.65	90
OPENSPEC ONSITE	22.81	63
CLUBHOUSE ONSIT	1.42	93

2H6V1263

Quick TR-55-Ver.5.46 S/N:
Executed: 13:54:19 04-19-2000

POST- DEVELOPMENT WATERSHED 4
SUBAREA 1

RUNOFF CURVE NUMBER DATA

Composite Area: WETLAND OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.00	60
SOIL C	0.01	73
COMPOSITE AREA --->	0.02	70.7 (71)

Composite Area: WOODS OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	36.99	55
SOIL C	2.83	70
COMPOSITE AREA --->	39.83	56.1 (56)

Composite Area: OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
COM/BUS SOIL B	2.86	92
COM/BUS SOIL C	2.81	94
RESIDENTIAL SOIL B	1.19	70
COMPOSITE AREA --->	6.85	89.0 (89)

2H6V1264

Composite Area: ROAD+RW OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
ROAD + ROW RT. 234 SOIL B	4.54	89
ROAD + ROW RT. 234 SOIL C	0.71	92
VDOT IMPROV. TO RT. 234 SOIL B	2.06	98
VDOT IMPROV. TO RT. 234 SOIL C	0.80	98
COMPOSITE AREA --->	8.11	92.4 (92)

Composite Area: WETLAND ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.67	60
SOIL C	0.84	73
SOIL D	3.67	79
COMPOSITE AREA --->	5.18	75.6 (76)

Composite Area: WOODS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	25.57	55
SOIL C	1.85	70
SOIL D	3.35	77
COMPOSITE AREA --->	30.77	58.3 (58)

Composite Area: RES1/8AC ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	21.45	85
SOIL C	6.44	90


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COMPOSITE AREA --->      27.89      86.2      ( 86 )
.....

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2H6V1266

Quick TR-55-Ver.5.46 S/N:
Executed: 13:54:19 04-19-2000

Composite Area: ROAD+R/W ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	10.37	89
SOIL C	2.24	92
SOIL D	0.04	93
COMPOSITE AREA --->	12.65	89.5

Composite Area: OPENSPEC ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	18.88	61
SOIL C	3.55	74
SOIL D	0.38	80
COMPOSITE AREA ---->	22.81	63.3 (63)

Composite Area: CLUBHOUSE ONSIT

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.94	92
SOIL C	0.48	94
COMPOSITE AREA --->	1.42	92.7 (93)

2H6V1267

Quick TR-55 Ver.5.46 S/N:
Executed: 10:10:19 04-21-2000

POST - DEVELOPMENT WATERSHED 4
SUBAREA 2

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
WETLAND OFFSITE	10.71	77
WETLANDS ONSITE	3.53	78
BRUSH OFFSITE	1.06	68
BRUSH ONSITE	10.34	67
WOODS ONSITE	17.66	55
ROAD+RW OFFSITE	11.39	90
ROAD+RW ONSITE	0.20	89
COM/BUS OFFSITE	50.74	92
RES 1/2AC OFFSI	18.41	70
RES CONDO ONSIT	2.07	85

126.11Ac

CN = ~~77.7~~
79.9

2H6V1268

POST - DEVELOPMENT WATERSHED 4
SUBAREA 2

RUNOFF CURVE NUMBER DATA

.....

Composite Area: WETLAND OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	1.09	60
SOIL C	0.30	73
SOIL D	9.32	79
COMPOSITE AREA --->	10.71	76.9 (77)

.....

Composite Area: WETLANDS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.15	60
SOIL D	3.38	79
COMPOSITE AREA --->	3.53	78.2 (78)

.....

Composite Area: BRUSH OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.96	67
SOIL C	0.10	77
COMPOSITE AREA --->	1.06	67.9 (68)

.....

Quick TR-55-Ver.5.46 S/N:
Executed: 10:10:19 04-21-2000

Composite Area: BRUSH ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	10.11	67
SOIL D	0.23	83
COMPOSITE AREA --->	10.34	67.4 (67)

.....

Composite Area: WOODS ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	17.26	55
SOIL C	0.18	70
SOIL D	0.22	77
COMPOSITE AREA --->	17.66	55.4 (55)

.....

Composite Area: ROAD+RW OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	7.78	89
SOIL C	1.77	92
SOIL D	1.84	93
COMPOSITE AREA --->	11.39	90.1 (90)

.....

Composite Area: ROAD+RW ONSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	0.20	89
COMPOSITE AREA --->	0.20	89.0 (89)

.....

Composite Area: COM/BUS OFFSITE

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	39.04	92
SOIL C	11.13	94
SOIL D	0.57	95
COMPOSITE AREA --->	50.74	92.5 (92)

Composite Area: RES 1/2AC OFFSI

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	18.17	70
SOIL C	0.01	80
SOIL D	0.23	85
COMPOSITE AREA --->	18.41	70.2 (70)

Composite Area: RES CONDO ONSIT

SURFACE DESCRIPTION	AREA (acres)	CN
SOIL B	2.07	85
COMPOSITE AREA --->	2.07	85.0 (85)

2H6V1271

Quick TR-55 Ver.5.46 S/N:
Executed: 20:41:22 04-21-2000

RUNOFF CHanneled ONTO PROPERTY BY WAY OF
A CULVERT UNDER I95

RUNOFF CURVE NUMBER SUMMARY

.....

Subarea Description	Area (acres)	CN (weighted)
I95 RUNOFF	46.35	90

2H6V1272

Quick TR-55 Ver.5.46 S/N:
Executed: 20:41:22 04-21-2000

RUNOFF CHanneled ONTO PROPERTY BY WAY OF
A CULVERT UNDER 195

RUNOFF CURVE NUMBER DATA

Composite Area: 195 RUNOFF

SURFACE DESCRIPTION	AREA (acres)	CN
SR-6	0.96	85
SOIL B M-2	16.74	85
BRUSH SOIL B	0.57	89
ROADWAY SOIL D	26.35	93
ROADWAY SOIL B	1.73	89
COMPOSITE AREA --->	46.35	89.7 (90)

2H6V1273

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:48:03

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .HYD

POST DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
WATERSHED 1	108.89	82.0	1.00	0.00	7.80	5.67	.06 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 108.89 acres or 0.1701 sq.mi

Peak discharge = 344 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	Interpolated (Yes/No)	
WATERSHED 1	0.94	0.00	1.00	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:48:03

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .HYD

POST DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
WATERSHED 1	344	12.8
Composite Watershed	344	12.8

2H6V1275

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:48:03

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .HYD

POST DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
WATERSHED 1	11	14	19	28	34	45	69	108	162
Total (cfs)	11	14	19	28	34	45	69	108	162

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
WATERSHED 1	223	279	317	344	302	231	169	128	99
Total (cfs)	223	279	317	344	302	231	169	128	99

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
WATERSHED 1	80	61	48	39	32	28	25	22	20
Total (cfs)	80	61	48	39	32	28	25	22	20

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
WATERSHED 1	19	16	14	12	0
Total (cfs)	19	16	14	12	0

2H6V1276

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:48:03

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .HYD

POST DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	11	14.8	44
11.1	12	14.9	41
11.2	13	15.0	39
11.3	14	15.1	38
11.4	16	15.2	36
11.5	17	15.3	35
11.6	19	15.4	33
11.7	22	15.5	32
11.8	25	15.6	31
11.9	28	15.7	30
12.0	34	15.8	30
12.1	45	15.9	29
12.2	69	16.0	28
12.3	108	16.1	27
12.4	162	16.2	27
12.5	223	16.3	26
12.6	279	16.4	26
12.7	317	16.5	25
12.8	344	16.6	24
12.9	323	16.7	24
13.0	302	16.8	23
13.1	266	16.9	23
13.2	231	17.0	22
13.3	200	17.1	22
13.4	169	17.2	21
13.5	149	17.3	21
13.6	128	17.4	20
13.7	114	17.5	20
13.8	99	17.6	20
13.9	89	17.7	20
14.0	80	17.8	19
14.1	74	17.9	19
14.2	67	18.0	19
14.3	61	18.1	19
14.4	57	18.2	18

2H6V1277

14.5	52	18.3	18
14.6	48	18.4	18
14.7	46	18.5	18

2H6V1278

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:48:03

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD1 .HYD

POST DEVELOPMENT HYDROGRAPH FOR WATERSHED 1

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	17	22.4	11
18.7	17	22.5	10
18.8	17	22.6	10
18.9	16	22.7	10
19.0	16	22.8	10
19.1	16	22.9	9
19.2	16	23.0	9
19.3	15	23.1	9
19.4	15	23.2	8
19.5	15	23.3	8
19.6	15	23.4	8
19.7	15	23.5	8
19.8	14	23.6	7
19.9	14	23.7	7
20.0	14	23.8	7
20.1	14	23.9	6
20.2	14	24.0	6
20.3	14	24.1	6
20.4	14	24.2	5
20.5	14	24.3	5
20.6	13	24.4	5
20.7	13	24.5	4
20.8	13	24.6	4
20.9	13	24.7	4
21.0	13	24.8	4
21.1	13	24.9	3
21.2	13	25.0	3
21.3	13	25.1	3
21.4	13	25.2	2
21.5	12	25.3	2
21.6	12	25.4	2
21.7	12	25.5	2
21.8	12	25.6	1
21.9	12	25.7	1
22.0	12	25.8	1
22.1	12	25.9	0
22.2	11		

2H6V1279

22.3

11

2H6V1280

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*****
*
*   FOUR SEASONS - POND4
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Pond File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND
Inflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POST100 .HYD
Outflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\P4100ALL.HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
660.0	13.00	-----	0.0	0.0	0.00	152.00
666.0	15.00	28.0	25.1	28.0	1.46	154.57
672.0	16.00	31.0	52.8	56.1	1.65	155.16
678.0	18.00	34.0	83.2	86.8	1.80	155.60
684.0	20.00	38.0	117.4	121.2	1.90	155.97
690.0	22.00	42.0	155.5	159.4	1.93	156.30
696.0	24.00	46.0	197.4	201.5	2.04	156.62
702.0	28.00	52.0	245.1	249.4	2.15	156.94
708.0	32.00	60.0	300.7	305.1	2.20	157.26
714.0	36.00	68.0	364.2	368.7	2.26	157.59
720.0	46.00	82.0	441.4	446.2	2.38	157.95
726.0	68.00	114.0	550.6	555.4	2.43	158.39
732.0	115.00	183.0	728.5	733.6	2.54	159.02
738.0	197.00	312.0	1018.2	1040.5	11.14	159.90
744.0	300.00	497.0	1367.6	1515.2	73.83	160.91
750.0	390.00	690.0	1759.3	2057.6	149.13	161.88
756.0	437.00	827.0	2066.7	2586.3	259.81	162.63
762.0	424.00	861.0	2232.3	2927.7	347.70	163.06
768.0	383.00	807.0	2283.4	3039.3	377.96	163.19
774.0	322.00	705.0	2260.4	2988.4	363.98	163.13
780.0	262.00	584.0	2192.9	2844.4	325.76	162.96
786.0	221.00	483.0	2111.9	2675.9	281.99	162.75
792.0	180.00	401.0	2029.6	2512.9	241.64	162.54
798.0	154.00	334.0	1948.5	2363.6	207.54	162.33
804.0	129.00	283.0	1872.6	2231.5	179.48	162.15
810.0	114.00	243.0	1798.8	2115.6	158.40	161.97
816.0	98.00	212.0	1720.3	2010.8	145.24	161.79
822.0	88.00	186.0	1633.2	1906.3	136.56	161.61
828.0	78.00	166.0	1560.9	1799.2	119.15	161.42
834.0	71.00	149.0	1500.8	1709.9	104.52	161.27
840.0	65.00	136.0	1451.1	1636.8	92.88	161.14
846.0	61.00	126.0	1410.4	1577.1	83.36	161.03
852.0	56.00	117.0	1376.0	1527.4	75.68	160.93
858.0	52.00	108.0	1345.8	1484.0	69.07	160.85
864.0	49.00	101.0	1320.0	1446.8	63.41	160.78

Pond File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\FOND4ALL.PND
 Inflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POST100 .HYD
 Outflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\P4100ALL.HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
870.0	47.00	96.0	1298.6	1416.0	58.72	160.72
876.0	44.00	91.0	1279.8	1389.6	54.87	160.67
882.0	42.00	86.0	1262.8	1365.8	51.52	160.62
888.0	40.00	82.0	1247.7	1344.8	48.54	160.57
894.0	39.00	79.0	1234.7	1326.7	45.99	160.54
900.0	37.00	76.0	1223.3	1310.7	43.73	160.50
906.0	36.00	73.0	1212.9	1296.3	41.69	160.48
912.0	35.00	71.0	1204.0	1283.9	39.94	160.45
918.0	35.00	70.0	1197.0	1274.0	38.54	160.43
924.0	34.00	69.0	1191.2	1266.0	37.40	160.41
930.0	33.00	67.0	1185.5	1258.2	36.32	160.40
936.0	32.00	65.0	1179.8	1250.5	35.36	160.38
942.0	31.00	63.0	1174.0	1242.8	34.39	160.36
948.0	31.00	62.0	1168.9	1236.0	33.54	160.35
954.0	30.00	61.0	1164.4	1229.9	32.78	160.33
960.0	29.00	59.0	1159.5	1223.4	31.96	160.32
966.0	28.00	57.0	1154.3	1216.5	31.09	160.31
972.0	28.00	56.0	1149.6	1210.3	30.31	160.29
978.0	27.00	55.0	1145.4	1204.6	29.61	160.28
984.0	27.00	54.0	1141.5	1199.4	28.95	160.27
990.0	26.00	53.0	1137.8	1194.5	28.34	160.26
996.0	25.00	51.0	1133.6	1188.8	27.63	160.24
1002.0	25.00	50.0	1129.7	1183.6	26.97	160.23
1008.0	24.00	49.0	1126.0	1178.7	26.35	160.22
1014.0	24.00	48.0	1122.4	1174.0	25.76	160.21
1020.0	23.00	47.0	1119.0	1169.4	25.19	160.20
1026.0	23.00	46.0	1115.8	1165.0	24.64	160.19
1032.0	22.00	45.0	1112.5	1160.8	24.11	160.18
1038.0	22.00	44.0	1109.4	1156.5	23.58	160.17
1044.0	21.00	43.0	1106.3	1152.4	23.06	160.16
1050.0	21.00	42.0	1103.2	1148.3	22.54	160.16
1056.0	21.00	42.0	1100.9	1145.2	22.15	160.15
1062.0	21.00	42.0	1099.2	1142.9	21.86	160.14
1068.0	20.00	41.0	1097.1	1140.2	21.52	160.14
1074.0	20.00	40.0	1094.8	1137.1	21.14	160.13
1080.0	20.00	40.0	1093.1	1134.8	20.85	160.13
1086.0	20.00	40.0	1091.8	1133.1	20.64	160.12
1092.0	20.00	40.0	1090.9	1131.8	20.48	160.12
1098.0	19.00	39.0	1089.4	1129.9	20.23	160.11
1104.0	19.00	38.0	1087.6	1127.4	19.92	160.11
1110.0	19.00	38.0	1086.2	1125.6	19.69	160.11
1116.0	19.00	38.0	1085.1	1124.2	19.52	160.10
1122.0	19.00	38.0	1084.4	1123.1	19.39	160.10
1128.0	18.00	37.0	1082.9	1121.4	19.21	160.10
1134.0	18.00	36.0	1081.0	1118.9	18.97	160.09
1140.0	18.00	36.0	1079.4	1117.0	18.78	160.09

Pond File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND
Inflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POST100 .HYD
Outflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\P4100ALL.HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
1146.0	18.00	36.0	1078.2	1115.4	18.62	160.08
1152.0	18.00	36.0	1077.2	1114.2	18.50	160.08
1158.0	17.00	35.0	1075.6	1112.2	18.30	160.07
1164.0	17.00	34.0	1073.5	1109.6	18.04	160.07
1170.0	17.00	34.0	1071.9	1107.5	17.83	160.06
1176.0	17.00	34.0	1070.5	1105.9	17.67	160.06
1182.0	17.00	34.0	1069.5	1104.5	17.53	160.06
1188.0	16.00	33.0	1067.8	1102.5	17.33	160.05
1194.0	16.00	32.0	1065.7	1099.8	17.06	160.04
1200.0	16.00	32.0	1064.0	1097.7	16.85	160.04
1206.0	16.00	32.0	1062.6	1096.0	16.68	160.03
1212.0	16.00	32.0	1061.5	1094.6	16.54	160.03
1218.0	16.00	32.0	1060.7	1093.5	16.44	160.03
1224.0	15.00	31.0	1059.2	1091.7	16.25	160.02
1230.0	15.00	30.0	1057.2	1089.2	16.00	160.02
1236.0	15.00	30.0	1055.6	1087.2	15.80	160.01
1242.0	15.00	30.0	1054.3	1085.6	15.64	160.01
1248.0	15.00	30.0	1053.3	1084.3	15.51	160.01
1254.0	15.00	30.0	1052.5	1083.3	15.41	160.00
1260.0	14.00	29.0	1051.0	1081.5	15.23	160.00
1266.0	14.00	28.0	1049.0	1079.0	14.98	159.99
1272.0	14.00	28.0	1047.5	1077.0	14.79	159.99
1278.0	14.00	28.0	1046.2	1075.5	14.63	159.99
1284.0	14.00	28.0	1045.2	1074.2	14.50	159.98
1290.0	14.00	28.0	1044.4	1073.2	14.40	159.98
1296.0	14.00	28.0	1043.7	1072.4	14.32	159.98
1302.0	13.00	27.0	1042.4	1070.7	14.16	159.97
1308.0	13.00	26.0	1040.6	1068.4	13.93	159.97
1314.0	13.00	26.0	1039.1	1066.6	13.74	159.96
1320.0	13.00	26.0	1037.9	1065.1	13.59	159.96
1326.0	13.00	26.0	1036.9	1063.9	13.48	159.96
1332.0	12.00	25.0	1035.4	1061.9	13.28	159.95
1338.0	12.00	24.0	1033.3	1059.4	13.02	159.95
1344.0	12.00	24.0	1031.7	1057.3	12.82	159.94
1350.0	11.00	23.0	1029.6	1054.7	12.56	159.94
1356.0	11.00	22.0	1027.1	1051.6	12.25	159.93
1362.0	11.00	22.0	1025.1	1049.1	12.00	159.92
1368.0	10.00	21.0	1022.7	1046.1	11.70	159.92
1374.0	10.00	20.0	1020.0	1042.7	11.36	159.91
1380.0	10.00	20.0	1017.8	1040.0	11.09	159.90
1386.0	9.00	19.0	1015.3	1036.8	10.77	159.89
1392.0	9.00	18.0	1012.4	1033.3	10.42	159.88
1398.0	9.00	18.0	1010.2	1030.4	10.13	159.88
1404.0	8.00	17.0	1007.5	1027.2	9.81	159.87
1410.0	8.00	16.0	1004.6	1023.5	9.45	159.86
1416.0	8.00	16.0	1002.3	1020.6	9.16	159.85

Pond File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND
 Inflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POST100 .HYD
 Outflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\P4100ALL.HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - 0 (cfs)	2S/t + 0 (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
1422.0	7.00	15.0	999.7	1017.3	8.83	159.85
1428.0	7.00	14.0	996.7	1013.7	8.46	159.84
1434.0	7.00	14.0	994.4	1010.7	8.17	159.83
1440.0	6.00	13.0	991.7	1007.4	7.84	159.82
1446.0	6.00	12.0	988.8	1003.7	7.47	159.81
1452.0	6.00	12.0	986.4	1000.8	7.18	159.81
1458.0	6.00	12.0	984.6	998.4	6.94	159.80
1464.0	5.00	11.0	981.9	995.6	6.81	159.79
1470.0	5.00	10.0	978.6	991.9	6.67	159.78
1476.0	5.00	10.0	975.5	988.6	6.54	159.77
1482.0	4.00	9.0	971.8	984.5	6.38	159.76
1488.0	4.00	8.0	967.4	979.8	6.20	159.75
1494.0	4.00	8.0	963.3	975.4	6.03	159.74
1500.0	3.00	7.0	958.6	970.3	5.84	159.72
1506.0	3.00	6.0	953.4	964.6	5.62	159.71
1512.0	3.00	6.0	948.5	959.4	5.42	159.69
1518.0	2.00	5.0	943.1	953.5	5.20	159.68
1524.0	2.00	4.0	937.2	947.1	4.95	159.66
1530.0	2.00	4.0	931.8	941.2	4.73	159.64
1536.0	1.00	3.0	925.8	934.8	4.48	159.63
1542.0	1.00	2.0	919.4	927.8	4.22	159.61
1548.0	1.00	2.0	913.4	921.4	3.97	159.59
1554.0	0.00	1.0	907.0	914.4	3.70	159.57

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

***** COMPOSITE OUTFLOW SUMMARY *****

Elevation (ft)	Q (cfs)	Contributing Structures
-----	-----	-----
152.00	0.0	
152.30	0.0	
152.60	0.5	1
152.90	0.7	1
153.20	0.9	1
153.50	1.1	1
153.80	1.2	1
154.10	1.3	1
154.40	1.4	1
154.70	1.5	1
155.00	1.6	1
155.30	1.7	1
155.60	1.8	1
155.90	1.9	1
156.20	1.9	1
156.50	2.0	1
156.80	2.1	1
157.10	2.2	1
157.40	2.2	1
157.70	2.3	1
158.00	2.4	1
158.30	2.4	1
158.60	2.5	1
158.90	2.5	1
159.20	2.6	1
159.50	2.7	1
159.80	6.9	2 +1
160.10	19.4	2 +1
160.40	36.5	2 +1
160.70	57.2	2 +1
161.00	81.0	2 +1
161.30	107.4	2 +1
161.60	136.3	2 +1
161.90	150.2	3 +2 +1
162.20	185.9	3 +2 +1
162.50	234.2	3 +2 +1
162.80	291.7	3 +2 +1
163.10	356.8	3 +2 +1
163.40	428.5	3 +2 +1
163.70	506.1	3 +2 +1

2H6V1285

164.00

589.0

3 +2 +1

2H6V1286

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

Outlet Structure File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.STR
Planimeter Input File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4.VOL
Rating Table Output File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND

Min. Elev.(ft) = 152 Max. Elev.(ft) = 164 Incr.(ft) = .3

Additional elevations (ft) to be included in table:

* * * * *

SYSTEM CONNECTIVITY

Structure	No.	Q Table	Q Table
-----	---	-----	-----
WEIR-VR	3	->	3
STAND PIPE	2	->	2
ORIFICE	1	->	1

Outflow rating table summary was stored in file:
P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND

2H6V1287

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR-VR

Weir - Vertical Rectangular

E1 elev.(ft)?	161.8
E2 elev.(ft)?	164.001
Weir coefficient?	3
Weir elev.(ft)?	161.8
Length (ft)?	40
Contracted/Suppressed (C/S)?	C

2H6V1288

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

Outflow Rating Table for Structure #3

WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
152.00	0.0	E < Inv.El. = 161.8
152.30	0.0	E < Inv.El. = 161.8
152.60	0.0	E < Inv.El. = 161.8
152.90	0.0	E < Inv.El. = 161.8
153.20	0.0	E < Inv.El. = 161.8
153.50	0.0	E < Inv.El. = 161.8
153.80	0.0	E < Inv.El. = 161.8
154.10	0.0	E < Inv.El. = 161.8
154.40	0.0	E < Inv.El. = 161.8
154.70	0.0	E < Inv.El. = 161.8
155.00	0.0	E < Inv.El. = 161.8
155.30	0.0	E < Inv.El. = 161.8
155.60	0.0	E < Inv.El. = 161.8
155.90	0.0	E < Inv.El. = 161.8
156.20	0.0	E < Inv.El. = 161.8
156.50	0.0	E < Inv.El. = 161.8
156.80	0.0	E < Inv.El. = 161.8
157.10	0.0	E < Inv.El. = 161.8
157.40	0.0	E < Inv.El. = 161.8
157.70	0.0	E < Inv.El. = 161.8
158.00	0.0	E < Inv.El. = 161.8
158.30	0.0	E < Inv.El. = 161.8
158.60	0.0	E < Inv.El. = 161.8
158.90	0.0	E < Inv.El. = 161.8
159.20	0.0	E < Inv.El. = 161.8
159.50	0.0	E < Inv.El. = 161.8
159.80	0.0	E < Inv.El. = 161.8
160.10	0.0	E < Inv.El. = 161.8
160.40	0.0	E < Inv.El. = 161.8
160.70	0.0	E < Inv.El. = 161.8
161.00	0.0	E < Inv.El. = 161.8
161.30	0.0	E < Inv.El. = 161.8
161.60	0.0	E < Inv.El. = 161.8
161.90	3.8	H = .1

2H6V1289

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

>>>>> Structure No. 2 <<<<<<
(Input Data)

STAND PIPE

Stand Pipe with weir or orifice flow

E1 elev.(ft)?	159.6
E2 elev.(ft)?	164.001
Crest elev.(ft)?	159.6
Diameter (ft)?	5
Weir coefficient?	3.0
Orifice coefficient?	.6
Start transition elev.(ft) @ ?	
Transition height (ft)?	

2H6V1290

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

>>>>> Structure No. 1 <<<<<<
(Input Data)

ORIFICE

Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	152.388
E2 elev.(ft)?	164.001
Orifice coeff.?	.64
Invert elev.(ft)?	152
Datum elev.(ft) ?	152.388
Orifice area (sq ft)?	.194

2H6V1291

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

>>>> CONTINUED from previous page <<<<

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation	Messages
162.20	30.3	H =.4	
162.50	70.0	H =.7	
162.80	119.4	H =1.0	
163.10	176.7	H =1.3	
163.40	240.9	H =1.6	
163.70	311.3	H =1.9	
164.00	387.3	H =2.2	

C = 3 L (ft) = 40

H (ft) = Table elev. - Invert elev. (161.8 ft)

Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

2H6V1292

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation	Messages
152.00	0.0	E < Inv.El.= 159.6	
152.30	0.0	E < E1= 159.6	
152.60	0.0	E < E1= 159.6	
152.90	0.0	E < E1= 159.6	
153.20	0.0	E < E1= 159.6	
153.50	0.0	E < E1= 159.6	
153.80	0.0	E < E1= 159.6	
154.10	0.0	E < E1= 159.6	
154.40	0.0	E < E1= 159.6	
154.70	0.0	E < E1= 159.6	
155.00	0.0	E < E1= 159.6	
155.30	0.0	E < E1= 159.6	
155.60	0.0	E < E1= 159.6	
155.90	0.0	E < E1= 159.6	
156.20	0.0	E < E1= 159.6	
156.50	0.0	E < E1= 159.6	
156.80	0.0	E < E1= 159.6	
157.10	0.0	E < E1= 159.6	
157.40	0.0	E < E1= 159.6	
157.70	0.0	E < E1= 159.6	
158.00	0.0	E < E1= 159.6	
158.30	0.0	E < E1= 159.6	
158.60	0.0	E < E1= 159.6	
158.90	0.0	E < E1= 159.6	
159.20	0.0	E < E1= 159.6	
159.50	0.0	E < E1= 159.6	
159.80	4.2	Weir:	H =.2
160.10	16.7	Weir:	H =.5
160.40	33.7	Weir:	H =.8
160.70	54.4	Weir:	H =1.1
161.00	78.1	Weir:	H =1.4
161.30	104.5	Weir:	H =1.7

2H6V1293

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

Date Executed:

S/N:

Time Executed:

>>>> CONTINUED from previous page <<<<

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation	Messages
161.60	133.3	Weir:	H =2.0
161.90	143.4	Orifice:	H =2.3
162.20	152.4	Orifice:	H =2.6
162.50	161.0	Orifice:	H =2.9
162.80	169.1	Orifice:	H =3.2
163.10	176.9	Orifice:	H =3.5
163.40	184.3	Orifice:	H =3.8
163.70	191.4	Orifice:	H =4.1
164.00	198.3	Orifice:	H =4.4

Weir $C_w = 3$ Weir length = 15.70796 ft
Orifice $C_o = .6$ Orifice area = 19.63496 sq.ft.
 $Q \text{ (cfs)} = (C_w * L * H^{1.5})$ or $(C_o * A * \text{sqr}(2*g*H))$
No transition used, transition height = 0.0
Weir equation = Orifice equation @ elev. = 161.6062 ft

2H6V1294

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

FOUR SEASONS - POND 4

Outflow Rating Table for Structure #1
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
-----	-----	-----
152.00	0.0	E < E1= 152.388
152.30	0.0	E < E1= 152.388
152.60	0.5	H =.212
152.90	0.7	H =.512
153.20	0.9	H =.812
153.50	1.1	H =1.112
153.80	1.2	H =1.412
154.10	1.3	H =1.712
154.40	1.4	H =2.012
154.70	1.5	H =2.312
155.00	1.6	H =2.612
155.30	1.7	H =2.912
155.60	1.8	H =3.212
155.90	1.9	H =3.512
156.20	1.9	H =3.812
156.50	2.0	H =4.112
156.80	2.1	H =4.412
157.10	2.2	H =4.712
157.40	2.2	H =5.012
157.70	2.3	H =5.312
158.00	2.4	H =5.612
158.30	2.4	H =5.912
158.60	2.5	H =6.212
158.90	2.5	H =6.512
159.20	2.6	H =6.812
159.50	2.7	H =7.112
159.80	2.7	H =7.412
160.10	2.8	H =7.712
160.40	2.8	H =8.012
160.70	2.9	H =8.312
161.00	2.9	H =8.612
161.30	3.0	H =8.912
161.60	3.0	H =9.212
161.90	3.1	H =9.512

2H6V1295

Outlet Structure File: POND4ALL.STR

POND-2 Version: 5.20

S/N:

Date Executed:

Time Executed:

>>>> CONTINUED from previous page <<<<

Outflow Rating Table for Structure #1
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
162.20	3.1	H =9.812
162.50	3.2	H =10.112
162.80	3.2	H =10.412
163.10	3.3	H =10.712
163.40	3.3	H =11.012
163.70	3.4	H =11.312
164.00	3.4	H =11.612

C = .64 A = .194 sq.ft.

H (ft) = Table elev. - Datum elev. (152.388 ft)

Q (cfs) = C * A * $\text{sqr}(2g * H)$

2H6V1296

***** SUMMARY OF ROUTING COMPUTATIONS *****

Pond File: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND
Inflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POST100.HYD
Outflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\P4100ALL.HYD

Starting Pond W.S. Elevation = 152.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow	=	437.00 cfs
Peak Outflow	=	377.96 cfs
Peak Elevation	=	163.19 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0 cu-ft
Peak Storage From Storm	=	479,036 cu-ft

Total Storage in Pond	=	479,036 cu-ft

Warning: Inflow hydrograph truncated on left side.

2H6V1297


```

*****
*
*   FOUR SEASONS - POND4
*
*
*
*
*****
  
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Inflow Hydrograph: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POST100 .HYD

Rating Table file: P:\PROJECTS\99-33\~CURRENT\SWM\JCS\QTR55\POND4ALL.PND

----INITIAL CONDITIONS----

Elevation = 152.00 ft
 Outflow = 0.00 cfs
 Storage = 0 cu-ft

2H6V1298

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
152.00	0.0	0
152.30	0.0	7
152.60	0.5	56
152.90	0.7	189
153.20	0.9	448
153.50	1.1	875
153.80	1.2	1,512
154.10	1.3	2,409
154.40	1.4	3,723
154.70	1.5	5,574
155.00	1.6	8,054
155.30	1.7	11,254
155.60	1.8	15,267
155.90	1.9	20,185
156.20	1.9	26,056
156.50	2.0	32,820
156.80	2.1	40,528
157.10	2.2	49,243
157.40	2.2	59,025
157.70	2.3	69,937
158.00	2.4	82,040
158.30	2.4	95,281
158.60	2.5	109,595
158.90	2.5	125,021
159.20	2.6	141,604
159.50	2.7	159,383
159.80	6.9	178,402
160.10	19.4	198,691
160.40	36.5	220,157
160.70	57.2	242,793
161.00	81.0	266,629

INTERMEDIATE ROUTING
 COMPUTATIONS

2S/t (cfs)	2S/t + 0 (cfs)
0.0	0.0
0.0	0.0
0.3	0.8
1.1	1.8
2.5	3.4
4.9	6.0
8.4	9.6
13.4	14.7
20.7	22.1
31.0	32.5
44.7	46.3
62.5	64.2
84.8	86.6
112.1	114.0
144.8	146.7
182.3	184.3
225.2	227.3
273.6	275.8
327.9	330.1
388.5	390.8
455.8	458.2
529.3	531.7
608.9	611.4
694.6	697.1
786.7	789.3
885.5	888.2
991.1	998.0
1103.8	1123.2
1223.1	1259.6
1348.8	1406.0
1481.3	1562.3

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (cu-ft)
161.30	107.4	291,697
161.60	136.3	318,027
161.90	150.2	345,649
162.20	185.9	374,573
162.50	234.2	404,754
162.80	291.7	436,212
163.10	356.8	468,975
163.40	428.5	503,067
163.70	506.1	538,516
164.00	589.0	575,350

INTERMEDIATE ROUTING
 COMPUTATIONS

2S/t (cfs)	2S/t + 0 (cfs)
1620.5	1727.9
1766.8	1903.1
1920.3	2070.5
2081.0	2266.9
2248.6	2482.8
2423.4	2715.1
2605.4	2962.2
2794.8	3223.3
2991.8	3497.9
3196.4	3785.4

Time increment (t) = 6.0 min.

2H6V1299

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-05-2000 10:17:22

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4B.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4 .HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW FROM WATERSHED 4 SUBAREA 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
FLW DNSTM POND4	126.11	79.0	0.75	0.00	7.80	5.32	.07 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 126.11 acres or 0.1970 sq.mi

Peak discharge = 444 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values		Rounded Values		Ia/p Interpolated	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	(Yes/No)	
FLW DNSTM POND4	0.77	0.00	0.75	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-05-2000 10:17:22

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4B.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4 .HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW FROM WATERSHED 4 SUBAREA 2

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
----- FLW DNSTM POND4 -----	444	12.6
----- Composite Watershed	444	12.6

2H6V1301

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-05-2000 10:17:22

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4B.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4 .HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW FROM WATERSHED 4 SUBAREA 2

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
FLW DNSTM POND4	14	19	25	38	48	71	121	203	308
Total (cfs)	14	19	25	38	48	71	121	203	308

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
FLW DNSTM POND4	398	444	430	387	264	180	129	97	78
Total (cfs)	398	444	430	387	264	180	129	97	78

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
FLW DNSTM POND4	64	51	43	37	32	28	25	23	21
Total (cfs)	64	51	43	37	32	28	25	23	21

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
FLW DNSTM POND4	20	18	16	13	0
Total (cfs)	20	18	16	13	0

2H6V1302

TR-55 TABULAR HYDROGRAPH METHOD
 Type II Distribution
 (24 hr. Duration Storm)

Executed: 05-05-2000 10:17:22

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4B.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4 .HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW FROM WATERSHED 4 SUBAREA 2

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	14	14.8	40
11.1	16	14.9	38
11.2	17	15.0	37
11.3	19	15.1	36
11.4	21	15.2	35
11.5	23	15.3	34
11.6	25	15.4	33
11.7	29	15.5	32
11.8	34	15.6	31
11.9	38	15.7	30
12.0	48	15.8	30
12.1	71	15.9	29
12.2	121	16.0	28
12.3	203	16.1	27
12.4	308	16.2	27
12.5	398	16.3	26
12.6	444	16.4	26
12.7	430	16.5	25
12.8	387	16.6	25
12.9	325	16.7	24
13.0	264	16.8	24
13.1	222	16.9	23
13.2	180	17.0	23
13.3	154	17.1	23
13.4	129	17.2	22
13.5	113	17.3	22
13.6	97	17.4	21
13.7	87	17.5	21
13.8	78	17.6	21
13.9	71	17.7	21
14.0	64	17.8	20
14.1	60	17.9	20
14.2	55	18.0	20
14.3	51	18.1	20
14.4	48	18.2	20

14.5	45	18.3	19
14.6	43	18.4	19
14.7	42	18.5	19

2H6V1304

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-05-2000 10:17:22

Watershed file: - >

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4B.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\POSTDD4 .HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW FROM WATERSHED 4 SUBAREA 2

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	19	22.4	12
18.7	19	22.5	11
18.8	18	22.6	11
18.9	18	22.7	11
19.0	18	22.8	10
19.1	18	22.9	10
19.2	18	23.0	10
19.3	17	23.1	9
19.4	17	23.2	9
19.5	17	23.3	9
19.6	17	23.4	8
19.7	17	23.5	8
19.8	16	23.6	8
19.9	16	23.7	7
20.0	16	23.8	7
20.1	16	23.9	7
20.2	16	24.0	6
20.3	16	24.1	6
20.4	15	24.2	6
20.5	15	24.3	6
20.6	15	24.4	5
20.7	15	24.5	5
20.8	15	24.6	5
20.9	15	24.7	4
21.0	14	24.8	4
21.1	14	24.9	4
21.2	14	25.0	3
21.3	14	25.1	3
21.4	14	25.2	3
21.5	14	25.3	2
21.6	14	25.4	2
21.7	13	25.5	2
21.8	13	25.6	1
21.9	13	25.7	1
22.0	13	25.8	1
22.1	13	25.9	0
22.2	12		

22.3

12

2H6V1306

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:46:16

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW RUNNING IN CHANNEL WHICH IS
BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
WATERSHED 1	108.89	80.0	1.00	0.00	7.80	5.44	.06 .10
I95	46.35	90.0	0.50	0.00	7.80	6.61	.03 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 155.24 acres or 0.2426 sq.mi

Peak discharge = 459 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	Interpolated (Yes/No)	
WATERSHED 1	0.94	0.00	1.00	0.00	No	Computed Ia/p < .1
I95	0.62	0.00	0.50	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

2H6V1307

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:46:16

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW RUNNING IN CHANNEL WHICH IS
BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
-----	-----	-----
WATERSHED 1	330	12.8
I95	253	12.4
-----	-----	-----
Composite Watershed	459	12.6

2H6V1308

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:46:16

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW RUNNING IN CHANNEL WHICH IS
BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
WATERSHED 1	10	14	19	27	32	44	67	104	155
I95	8	11	15	27	45	81	147	224	253
Total (cfs)	18	25	34	54	77	125	214	328	408

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
WATERSHED 1	214	267	305	330	290	221	162	123	95
I95	243	192	142	108	67	46	35	29	25
Total (cfs)	457	459	447	438	357	267	197	152	120

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
WATERSHED 1	77	58	46	37	31	27	24	21	19
I95	22	20	17	15	14	12	11	10	10
Total (cfs)	99	78	63	52	45	39	35	31	29

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
WATERSHED 1	19	16	14	11	0
I95	9	8	7	6	0

2H6V1309

Total (cfs)	28	24	21	17	0
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2H6V1310

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:46:16

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW RUNNING IN CHANNEL WHICH IS
BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	18	14.8	58
11.1	20	14.9	55
11.2	23	15.0	52
11.3	25	15.1	51
11.4	28	15.2	49
11.5	31	15.3	48
11.6	34	15.4	46
11.7	41	15.5	45
11.8	47	15.6	44
11.9	54	15.7	43
12.0	77	15.8	41
12.1	125	15.9	40
12.2	214	16.0	39
12.3	328	16.1	38
12.4	408	16.2	37
12.5	457	16.3	37
12.6	459	16.4	36
12.7	447	16.5	35
12.8	438	16.6	34
12.9	398	16.7	33
13.0	357	16.8	33
13.1	312	16.9	32
13.2	267	17.0	31
13.3	232	17.1	31
13.4	197	17.2	30
13.5	175	17.3	30
13.6	152	17.4	29
13.7	136	17.5	29
13.8	120	17.6	29
13.9	110	17.7	29
14.0	99	17.8	28
14.1	92	17.9	28
14.2	85	18.0	28
14.3	78	18.1	28
14.4	73	18.2	27

2H6V1311

14.5	68	18.3	27
14.6	63	18.4	26
14.7	60	18.5	26

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 09:46:16

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PST1AI95.HYD

POST-DEVELOPMENT HYDROGRAPH FOR FLOW RUNNING IN CHANNEL WHICH IS
BETWEEN THE OUTLET OF WS1 AND THE OUTLET OF WS4

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	26	22.4	15
18.7	25	22.5	15
18.8	25	22.6	14
18.9	24	22.7	14
19.0	24	22.8	14
19.1	24	22.9	13
19.2	23	23.0	13
19.3	23	23.1	12
19.4	23	23.2	12
19.5	22	23.3	11
19.6	22	23.4	11
19.7	22	23.5	11
19.8	22	23.6	10
19.9	21	23.7	10
20.0	21	23.8	9
20.1	21	23.9	9
20.2	21	24.0	8
20.3	20	24.1	8
20.4	20	24.2	8
20.5	20	24.3	7
20.6	20	24.4	7
20.7	20	24.5	6
20.8	19	24.6	6
20.9	19	24.7	6
21.0	19	24.8	5
21.1	19	24.9	5
21.2	19	25.0	4
21.3	18	25.1	4
21.4	18	25.2	3
21.5	18	25.3	3
21.6	18	25.4	3
21.7	18	25.5	2
21.8	17	25.6	2
21.9	17	25.7	1
22.0	17	25.8	1
22.1	17	25.9	0
22.2	16		

2H6V1313

22.3

16

2H6V1314

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:01

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.HYD

POST-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING THROUGH
CULVERT UNDER I95

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
FLW UPSTM POND4	155.53	70.0	0.75	0.50	7.80	4.29	.11 .10
FLW DNSTM POND4	126.11	79.0	0.75	0.00	7.80	5.32	.07 .10
FLOW FROM WS 1	108.89	82.0	1.00	0.00	7.80	5.67	.06 .10
FLOW FROM I95	46.35	90.0	0.50	0.10	7.80	6.61	.03 .10

* Travel time from subarea outfall to composite watershed outfall point.

Total area = 436.88 acres or 0.6826 sq.mi

Peak discharge = 1127 cfs

>>>> Computer Modifications of Input Parameters <<<<

Subarea Description	Input Values		Rounded Values		Ia/p Interpolated	Ia/p Messages
	Tc (hr)	* Tt (hr)	Tc (hr)	* Tt (hr)	(Yes/No)	
FLW UPSTM POND4	0.65	0.66	0.75	0.50	No	--
FLW DNSTM POND4	0.77	0.00	0.75	0.00	No	Computed Ia/p < .1
FLOW FROM WS 1	0.94	0.01	1.00	0.00	No	Computed Ia/p < .1
FLOW FROM I95	0.62	0.01	0.50	0.10	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

2H6V1315

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:01

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.HYD

POST-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING THROUGH
CULVERT UNDER I95

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
FLW UPSTM POND4	373	13.0
FLW DNSTM POND4	444	12.6
FLOW FROM WS 1	344	12.8
FLOW FROM I95	239	12.5
Composite Watershed	1127	12.8

2H6V1316

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:01

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.HYD

POST-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING THROUGH
CULVERT UNDER I95

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
FLW UPSTM POND4	9	13	17	22	25	28	32	41	55
FLW DNSTM POND4	14	19	25	38	48	71	121	203	308
LOW FROM WS 1	11	14	19	28	34	45	69	108	162
LOW FROM I95	8	11	14	24	38	67	121	189	232
Total (cfs)	42	57	75	112	145	211	343	541	757

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
FLW UPSTM POND4	85	133	198	269	373	358	286	209	150
FLW DNSTM POND4	398	444	430	387	264	180	129	97	78
LOW FROM WS 1	223	279	317	344	302	231	169	128	99
LOW FROM I95	239	208	164	127	78	52	38	31	26
Total (cfs)	945	1064	1109	1127	1017	821	622	465	353

2H6V1317

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:01

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.HYD

POST-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING THROUGH
CULVERT UNDER I95

Composite Hydrograph Summary (cfs)

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
FLW UPSTM POND4	111	77	58	45	36	31	28	25	23
FLW DNSTM POND4	64	51	43	37	32	28	25	23	21
FLOW FROM WS 1	80	61	48	39	32	28	25	22	20
FLOW FROM I95	23	20	17	16	14	12	11	10	10
Total (cfs)	278	209	166	137	114	99	89	80	74

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
FLW UPSTM POND4	21	19	17	13	0
FLW DNSTM POND4	20	18	16	13	0
FLOW FROM WS 1	19	16	14	12	0
FLOW FROM I95	9	8	7	6	0
Total (cfs)	69	61	54	44	0

2H6V1318

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:01

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.HYD

POST-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING THROUGH
CULVERT UNDER I95

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	42	14.8	152
11.1	47	14.9	144
11.2	52	15.0	137
11.3	57	15.1	132
11.4	63	15.2	128
11.5	69	15.3	123
11.6	75	15.4	119
11.7	87	15.5	114
11.8	100	15.6	111
11.9	112	15.7	108
12.0	145	15.8	105
12.1	211	15.9	102
12.2	343	16.0	99
12.3	541	16.1	97
12.4	757	16.2	95
12.5	945	16.3	93
12.6	1064	16.4	91
12.7	1109	16.5	89
12.8	1127	16.6	87
12.9	1072	16.7	85
13.0	1017	16.8	84
13.1	919	16.9	82
13.2	821	17.0	80
13.3	721	17.1	79
13.4	622	17.2	78
13.5	544	17.3	76
13.6	465	17.4	75
13.7	409	17.5	74
13.8	353	17.6	73
13.9	316	17.7	72
14.0	278	17.8	71
14.1	255	17.9	70
14.2	232	18.0	69
14.3	209	18.1	68
14.4	195	18.2	67

14.5	180	18.3	67
14.6	166	18.4	66
14.7	152	18.5	65

2H6V1320

TR-55 TABULAR HYDROGRAPH METHOD
Type II Distribution
(24 hr. Duration Storm)

Executed: 05-04-2000 08:19:01

Watershed file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.WSD

Hydrograph file: -->

P:\PROJECTS\99-33\~CURRENT\SWM\QTR55\PSTI95TL.HYD

POST-DEVELOPMENT HYDROGRAPH FOR ALL FLOW TRAVELING THROUGH
CULVERT UNDER I95

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	64	22.4	40
18.7	63	22.5	38
18.8	63	22.6	37
18.9	62	22.7	36
19.0	61	22.8	35
19.1	60	22.9	34
19.2	60	23.0	33
19.3	59	23.1	32
19.4	58	23.2	31
19.5	58	23.3	30
19.6	57	23.4	29
19.7	56	23.5	28
19.8	55	23.6	26
19.9	55	23.7	25
20.0	54	23.8	24
20.1	54	23.9	23
20.2	53	24.0	22
20.3	52	24.1	21
20.4	52	24.2	20
20.5	52	24.3	19
20.6	51	24.4	18
20.7	50	24.5	16
20.8	50	24.6	15
20.9	50	24.7	14
21.0	49	24.8	13
21.1	48	24.9	12
21.2	48	25.0	11
21.3	48	25.1	10
21.4	47	25.2	9
21.5	46	25.3	8
21.6	46	25.4	7
21.7	46	25.5	6
21.8	45	25.6	4
21.9	44	25.7	3
22.0	44	25.8	2
22.1	43	25.9	1
22.2	42		

2H6V1321

22.3

41

2H6V1322

POST DEVELOPMENT HYDROGRAPH FOR TOTAL FLOW WITHIN WATERSHED 4

<u>TIME</u>		<u>Outflow Pond 4</u>	<u>Outflow WS 4-2</u>	<u>Outflow WS 1 + 195</u>	<u>Total Outflow</u>
(min)	(hrs)				
702	11.7	0.584	29	41	70.584
708	11.8	1.536	34	47	82.536
714	11.9	1.71	38	54	93.71
720	12	1.84	48	77	126.84
726	12.1	1.912	71	125	197.912
732	12.2	1.974	121	214	336.974
738	12.3	2.084	203	328	533.084
744	12.4	2.17	308	408	718.17
750	12.5	2.224	398	457	857.224
756	12.6	2.308	444	459	905.308
762	12.7	2.4	430	447	879.4
768	12.8	2.474	387	438	827.474
774	12.9	5.98	325	398	728.98
780	13	36.216	264	357	657.216
786	13.1	103.95	222	312	637.95
792	13.2	193.402	180	267	640.402
798	13.3	294.966	154	232	680.966
804	13.4	359.804	129	197	685.804
810	13.5	369.572	113	175	657.572
816	13.6	341.048	97	152	590.048
822	13.7	299.498	87	136	522.498
828	13.8	257.78	78	120	455.78
834	13.9	221.18	71	110	402.18
840	14	190.704	64	99	353.704
846	14.1	166.832	60	92	318.832
852	14.2	150.504	55	85	290.504
858	14.3	140.032	51	78	269.032
864	14.4	126.114	48	73	247.114
870	14.5	110.372	46	68	224.372
876	14.6	97.536	43	63	203.536
882	14.7	37.152	42	60	139.152

2H6V1323

2H6V1517

SECTION V

HEC-2 / BOSS ANALYSIS

2H6V1324

Normal Depth Results

Cross-Section:	10001	
Elevation:	102.95	ft MSL
Depth:	4.95	ft
Discharge:	395.00	cfs
Energy Gradient:	0.0176	ft/ft
Froude Number:	0.3788	
Flow Regime:	Subcritical	
Flow Area:	82.60	sq ft
Average Velocity:	4.79	ft/s
Maximum Velocity:	12.53	ft/s
Composite n:	0.1065	
Hydraulic Radius:	2.23	ft
Wetted Perimeter:	37.12	ft
Wetted Top Width:	34.36	ft
Critical Slope:	0.2802	ft/ft

Normal Depth Results

Cross-Section:	10001	
Elevation:	103.28	ft MSL
Depth:	5.28	ft
Discharge:	459.00	cfs
Energy Gradient:	0.0176	ft/ft
Froude Number:	0.3746	
Flow Regime:	Subcritical	
Flow Area:	94.04	sq ft
Average Velocity:	4.89	ft/s
Maximum Velocity:	13.08	ft/s
Composite n:	0.1071	
Hydraulic Radius:	2.39	ft
Wetted Perimeter:	39.38	ft
Wetted Top Width:	36.51	ft
Critical Slope:	0.2747	ft/ft

Normal Depth Results

Cross-Section:	20100	
Elevation:	84.96	ft MSL
Depth:	3.46	ft
Discharge:	177.20	cfs
Energy Gradient:	0.024	ft/ft
Froude Number:	0.3554	
Flow Regime:	Subcritical	
Flow Area:	47.27	sq ft
Average Velocity:	3.74	ft/s
Maximum Velocity:	11.31	ft/s
Composite n:	0.1097	
Hydraulic Radius:	1.16	ft
Wetted Perimeter:	40.61	ft
Wetted Top Width:	39.23	ft
Critical Slope:	0.4927	ft/ft

Normal Depth Results

Cross-Section:	20100	
Elevation:	85.30	ft MSL
Depth:	3.80	ft
Discharge:	232.17	cfs
Energy Gradient:	0.024	ft/ft
Froude Number:	0.3374	
Flow Regime:	Subcritical	
Flow Area:	62.21	sq ft
Average Velocity:	3.72	ft/s
Maximum Velocity:	12.06	ft/s
Composite n:	0.1105	
Hydraulic Radius:	1.28	ft
Wetted Perimeter:	48.73	ft
Wetted Top Width:	47.32	ft
Critical Slope:	0.1863	ft/ft

2H6V1325

Normal Depth Results

Cross-Section:	30001	
Elevation:	71.17	ft MSL
Depth:	1.17	ft
Discharge:	360.25	cfs
Energy Gradient:	0.0309	ft/ft
Froude Number:	0.2861	
Flow Regime:	Subcritical	
Flow Area:	204.78	sq ft
Average Velocity:	1.75	ft/s
Maximum Velocity:	1.75	ft/s
Composite n:	0.105	
Hydraulic Radius:	0.59	ft
Wetted Perimeter:	348.66	ft
Wetted Top Width:	348.60	ft
Critical Slope:	0.3816	ft/ft

Normal Depth Results

Cross-Section:	30001	
Elevation:	71.51	ft MSL
Depth:	1.51	ft
Discharge:	699.86	cfs
Energy Gradient:	0.0309	ft/ft
Froude Number:	0.2944	
Flow Regime:	Subcritical	
Flow Area:	340.43	sq ft
Average Velocity:	2.08	ft/s
Maximum Velocity:	2.08	ft/s
Composite n:	0.105	
Hydraulic Radius:	0.76	ft
Wetted Perimeter:	449.54	ft
Wetted Top Width:	449.46	ft
Critical Slope:	0.3506	ft/ft

Normal Depth Results

Cross-Section:	40001	
Elevation:	92.61	ft MSL
Depth:	3.61	ft
Discharge:	848.00	cfs
Energy Gradient:	0.0164	ft/ft
Froude Number:	0.2943	
Flow Regime:	Subcritical	
Flow Area:	267.36	sq ft
Average Velocity:	3.17	ft/s
Maximum Velocity:	9.84	ft/s
Composite n:	0.1063	
Hydraulic Radius:	1.58	ft
Wetted Perimeter:	168.70	ft
Wetted Top Width:	166.51	ft
Critical Slope:	0.3201	ft/ft

Normal Depth Results

Cross-Section:	40001	
Elevation:	92.98	ft MSL
Depth:	3.98	ft
Discharge:	1127.00	cfs
Energy Gradient:	0.0164	ft/ft
Froude Number:	0.3007	
Flow Regime:	Subcritical	
Flow Area:	330.97	sq ft
Average Velocity:	3.40	ft/s
Maximum Velocity:	10.51	ft/s
Composite n:	0.1065	
Hydraulic Radius:	1.88	ft
Wetted Perimeter:	175.96	ft
Wetted Top Width:	173.69	ft
Critical Slope:	0.2819	ft/ft

BOSS RiverCAD HEC-2 Analysis version 4.0
PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01

PAGE
5/08, 2000

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BOSS RiverCAD (tm)
=====

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Version : 4.0
Serial Number : 10120

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PROGRAM ORIGIN :

BOSS RiverCAD HEC-2 Analysis is an enhanced version of the U.S.
Army Corps of Engineers Hydrologic Engineering Center HEC-2 program
for water-surface profile computations. Program based upon the September
1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 1 PRE-DEVELOPMENT
ENGINEER : TIM EVERLY
DATE OF RUN : 5/08/2000
TIME OF RUN : 11:46 pm

2H6V1327

T1 99-33-01
 T2 FOUR SEASONS IN HIST. VA. - FLOODPLAIN STUDY
 T3 WATERSHED 1 PRE-DEVELOPMENT
 T4 FLOW REDUCTION @ CROSS SECTION 10100 TO ACCOUNT FOR FLOW CHanneled
 T4 ONTO THE PROPERTY BY WAY OF A CULVERT UNDER I-95

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q
	-10	2						395
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW
	-1		-1					-6

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 10001.000.

2H6V1328

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2001

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONTR
10001.000	0.120	0.035	0.110	7.44	105.44	0.00	105.44
0.002110	0	0	0	105.65	0.21	0.00	0.00
0.00	77	25	85	0.00	99.00	99.00	0
395	122	142	129	51.0	1009.44	1060.43	0
0.00	1.58	5.69	1.51	0.000	0.0	98.00	0

STATUS: Analyzing cross-section reach 10002.000.

10002.000	0.120	0.035	0.110	7.15	105.65	0.00	0.00
0.001978	29	28	28	105.72	0.06	0.06	0.01
0.14	81	10	140	0.00	99.50	99.50	2
395	118	43	232	60.2	1008.52	1068.72	0
0.00	1.45	4.11	1.65	0.000	0.0	98.50	0

STATUS: Analyzing cross-section reach 10100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

0.

2H6V1329

5/08/2000

ECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

10100.000	0.110	0.040	0.110	5.01	106.01	0.00	0.00
0.004317	188	102	85	106.07	0.06	0.35	0.00
0.77	119	7	32	0.00	102.00	102.00	2
235	152	30	52	103.6	1048.54	1152.15	0
0.03	1.28	4.06	1.62	0.000	0.3	101.00	0

STATUS: Analyzing cross-section reach 10200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.63

10200.000	0.100	0.046	0.100	3.87	106.37	0.00	0.00
0.011012	42	98	86	106.47	0.10	0.39	0.01
0.93	69	5	28	0.00	103.50	103.50	2
235	143	27	63	76.8	1061.58	1138.41	0
0.03	2.07	4.75	2.22	0.000	0.4	102.50	0

STATUS: Analyzing cross-section reach 10300.000.

10300.000	0.110	0.052	0.120	3.32	107.82	0.00	0.00
0.020043	104	102	95	107.93	0.11	1.45	0.00
1.17	28	4	66	0.00	105.50	105.50	2
235	72	25	136	85.7	1033.52	1119.25	0
0.04	2.51	5.12	2.07	0.000	0.6	104.50	0

STATUS: Analyzing cross-section reach 10400.000.

10400.000	0.110	0.052	0.120	4.45	109.35	0.00	0.00
0.019144	69	102	92	109.61	0.26	1.64	0.04
1.33	53	8	13	0.00	105.90	105.90	2
235	144	60	30	60.8	1038.99	1099.77	0
0.05	2.69	6.74	2.22	0.000	0.8	104.90	0

STATUS: Analyzing cross-section reach 10500.000.

10500.000	0.120	0.046	0.110	3.07	110.36	0.00	0.00
0.010995	41	97	66	110.58	0.22	0.96	0.00
1.46	6	13	80	0.00	107.95	107.95	2
235	10	77	146	70.7	1029.59	1100.34	0
0.06	1.54	5.97	1.82	0.000	0.8	107.29	0

STATUS: Analyzing cross-section reach 10600.000.

2H6V1330

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
10600.000	0.120	0.046	0.110	3.02	111.46	111.46	0.00
0.031374	66	101	56	112.30	0.84	1.35	0.19
1.58	34	12	3	0.00	109.10	109.10	2
235	108	119	7	30.0	1086.30	1116.26	5
0.06	3.10	9.88	2.36	0.000	- 0.9	108.44	0

STATUS: Analyzing cross-section reach 10700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.43

10700.000	0.120	0.046	0.110	3.22	114.22	0.00	0.00
0.015247	102	105	75	114.34	0.12	1.97	0.07
1.72	26	1	57	0.00	111.50	111.50	2
235	57	6	170	46.1	1072.13	1118.23	0
0.07	2.17	4.19	2.95	0.000	1.0	111.00	0

STATUS: Analyzing cross-section reach 10800.000.

.0800.000	0.120	0.046	0.110	3.24	115.74	0.00	0.00
0.020715	64	93	90	115.84	0.11	1.50	0.00
1.89	17	1	74	0.00	113.00	113.00	2
235	44	7	182	78.9	1062.64	1141.54	0
0.08	2.62	4.90	2.45	0.000	1.1	112.50	0

STATUS: Analyzing cross-section reach 10900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.80

2H6V1331

5/08/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TCPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

10900.000	0.120	0.046	0.110	3.09	116.49	0.00	0.00
0.006371	114	90	29	116.52	0.03	0.67	0.01
2.09	101	1	58	0.00	113.90	113.90	3
235	134	4	96	103.9	1021.22	1125.13	0
0.09	1.33	2.63	1.64	0.000	1.3	113.40	0

STATUS: Analyzing cross-section reach 11000.000.

STATUS: (3235) The computed slope of the energy grade line exceeded 0.10, and critical depth has probably been crossed.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

300.000	0.120	0.046	0.110	2.75	117.25	117.25	0.00
.105911	35	94	101	117.66	0.42	0.99	0.11
2.24	35	1	12	0.00	115.00	115.00	3
235	156	13	65	51.5	1041.00	1092.52	10
0.09	4.44	9.91	5.37	0.000	1.4	114.50	0

STATUS: Analyzing cross-section reach 11100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.74

11100.000	0.120	0.046	0.110	3.47	119.57	0.00	0.00
0.014104	46	97	90	119.68	0.11	1.99	0.03
2.34	47	1	41	0.00	116.60	116.60	6
235	113	7	114	47.1	1016.50	1063.58	0
0.10	2.41	4.24	2.76	0.000	1.4	116.10	0

STATUS: Analyzing cross-section reach 11200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.62

2H6V1332

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

11200.000	0.120	0.046	0.110	3.26	121.11	0.00	0.00
0.036921	98	98	63	121.32	0.21	1.61	0.03
2.48	6	1	57	0.00	118.35	118.35	4
235	20	10	203	50.9	1008.80	1059.75	0
0.11	3.06	6.56	3.54	0.000	1.5	117.85	0

STATUS: Analyzing cross-section reach 11300.000.

11300.000	0.120	0.046	0.110	2.78	122.53	0.00	0.00
0.022156	95	100	34	122.67	0.14	1.34	0.01
2.56	22	2	66	0.00	120.25	120.25	3
235	52	17	164	67.9	1010.22	1078.08	0
0.11	2.29	6.69	2.50	0.000	1.6	119.75	0

STATUS: Analyzing cross-section reach 11400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.51

11400.000	0.120	0.046	0.110	2.40	124.00	0.00	0.00
0.079108	66	64	35	124.35	0.35	1.62	0.06
2.64	5	2	52	0.00	122.10	122.10	2
235	16	24	194	62.3	1024.62	1086.89	0
0.11	3.23	10.25	3.66	0.000	1.6	121.60	0

STATUS: Analyzing cross-section reach 11500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 3.51

11500.000	0.120	0.046	0.110	3.16	126.16	0.00	0.00
0.006410	21	170	160	126.19	0.03	1.80	0.03
2.91	122	3	71	0.00	123.50	123.50	5
235	135	11	87	167.4	1043.56	1210.99	0
0.14	1.11	3.93	1.21	0.000	1.9	123.00	0

STATUS: Analyzing cross-section reach 11600.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	CLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
11600.000	0.120	0.046	0.110	2.91	127.41	127.41	0.00
0.070921	36	69	91	128.03	0.61	0.95	0.17
3.07	20	2	23	0.00	125.00	125.00	20
235	89	34	110	37.1	1129.49	1166.63	15
0.14	4.31	12.36	4.62	0.000	2.0	124.50	0

STATUS: Analyzing cross-section reach 11700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.35

11700.000	0.120	0.046	0.110	3.21	129.71	0.00	0.00
0.012865	38	106	87	129.80	0.09	1.72	0.05
3.19	76	3	45	0.00	127.00	127.00	6
235	114	17	102	106.0	1054.33	1160.28	0
0.15	1.50	5.65	2.25	0.000	2.1	126.50	0

STATUS: Analyzing cross-section reach 11800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.44

1800.000	0.120	0.046	0.110	2.64	131.64	0.00	0.00
0.067138	81	101	86	132.00	0.36	2.12	0.08
3.38	55	2	11	0.00	129.50	129.50	3
235	163	28	43	78.9	1042.57	1121.44	0
0.16	2.94	11.21	3.62	0.000	2.3	129.00	0

STATUS: Analyzing cross-section reach 11900.000.

STATUS: (3265) Divided flow.

2H6V1334

5/08,

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

2.35

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
11900.000	0.120	0.046	0.110	3.34	133.84	0.00	0.00
0.012153	75	89	86	133.91	0.07	1.88	0.03
3.56	111	2	18	0.00	131.00	131.00	4
235	179	15	39	108.5	1014.93	1131.01	0
0.17	1.62	5.35	2.16	0.000	2.5	130.50	0

STATUS: Analyzing cross-section reach 12000.000.

12000.000	0.100	0.040	0.100	4.67	136.20	0.00	0.00
0.016830	236	108	80	136.49	0.29	2.52	0.07
4.01	34	4	29	0.00	132.20	132.20	4
235	102	37	95	44.8	1096.82	1141.62	0
0.18	2.98	8.21	3.19	0.000	2.8	131.53	

STATUS: Analyzing cross-section reach 12100.000.

12100.000	0.100	0.040	0.100	3.97	137.30	0.00	0.00
0.020581	34	85	72	137.54	0.24	1.05	0.01
4.10	44	3	29	0.00	134.00	134.00	2
235	118	31	85	69.3	1113.60	1182.90	0
0.18	2.66	8.13	2.89	0.000	2.9	133.33	0

STATUS: Analyzing cross-section reach 12200.000.

12200.000	0.100	0.040	0.100	2.70	139.03	0.00	0.00
0.031806	35	101	80	139.27	0.24	1.72	0.00
4.20	11	2	53	0.00	137.00	137.00	3
235	31	20	183	54.1	1112.20	1166.32	0
0.19	2.73	7.74	3.41	0.000	3.0	136.33	0

STATUS: Analyzing cross-section reach 12300.000.

12300.000	0.120	0.063	0.120	3.41	141.54	0.00	0.00
0.032765	77	99	71	141.70	0.16	2.43	0.01
4.33	35	2	39	0.00	138.80	138.80	3
235	84	10	140	60.0	1143.52	1203.48	0
0.20	2.39	4.65	3.53	0.000	3.1	138.13	0

STATUS: Analyzing cross-section reach 12400.000.

2H6V1335

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

1.85

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
12400.000	0.120	0.063	0.120	2.80	143.10	0.00	0.00
0.009529	95	92	86	143.18	0.07	1.46	0.01
4.55	67	5	56	0.00	140.50	140.50	4
235	109	24	100	90.0	1041.04	1131.08	0
0.21	1.62	4.40	1.77	0.000	3.2	140.30	0

STATUS: Analyzing cross-section reach 12500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

0.39

12500.000	0.120	0.063	0.120	1.74	144.04	0.00	0.00
0.061519	46	103	48	144.28	0.24	1.05	0.05
4.66	39	3	31	0.00	142.50	142.50	2
235	125	27	82	83.7	1021.59	1105.26	0
0.21	3.20	8.07	2.62	0.000	3.3	142.30	0

STATUS: Analyzing cross-section reach 12600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

1.90

12600.000	0.120	0.063	0.120	2.15	146.95	0.00	0.00
0.017071	97	96	88	147.05	0.09	2.76	0.01
4.86	51	4	53	0.00	145.00	145.00	5
235	105	20	108	79.7	1023.37	1103.06	0
0.22	2.04	4.92	2.03	0.000	3.5	144.80	0

2H6V1336

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

----- WATERSHED 1 PRE-DEVELOPMENT

99-33-01

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRISW
10001.000	0.00	0.00	0.00	98.00	395.00	105.44	0.0
10002.000	28.38	0.00	0.00	98.50	395.00	105.65	0.0
* 10100.000	102.83	0.00	0.00	101.00	235.00	106.01	0.0
0200.000	98.18	0.00	0.00	102.50	235.00	106.37	0
10300.000	102.11	0.00	0.00	104.50	235.00	107.82	0.0
10400.000	102.49	0.00	0.00	104.90	235.00	109.35	0.0
10500.000	97.67	0.00	0.00	107.29	235.00	110.36	0.0
* 10600.000	101.47	0.00	0.00	108.44	235.00	111.46	111.4
10700.000	105.21	0.00	0.00	111.00	235.00	114.22	0.0
10800.000	93.36	0.00	0.00	112.50	235.00	115.74	0.0
10900.000	90.86	0.00	0.00	113.40	235.00	116.49	0.0
11000.000	94.58	0.00	0.00	114.50	235.00	117.25	117.2
* 11100.000	97.28	0.00	0.00	116.10	235.00	119.57	0.0
11200.000	98.85	0.00	0.00	117.85	235.00	121.11	0.0
11300.000	100.80	0.00	0.00	119.75	235.00	122.53	0.0
11400.000	64.52	0.00	0.00	121.60	235.00	124.00	0.0

2H6V1337

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRISW
11500.000	170.47	0.00	0.00	123.00	235.00	126.16	0.0
* 11600.000	69.17	0.00	0.00	124.50	235.00	127.41	127.4
11700.000	106.65	0.00	0.00	126.50	235.00	129.71	0.0
11800.000	101.83	0.00	0.00	129.00	235.00	131.64	0.0
* 11900.000	89.17	0.00	0.00	130.50	235.00	133.84	0.0
12000.000	108.38	0.00	0.00	131.53	235.00	136.20	0.0
12100.000	85.55	0.00	0.00	133.33	235.00	137.30	0.0
12200.000	101.66	0.00	0.00	136.33	235.00	139.03	0.0
12300.000	99.25	0.00	0.00	138.13	235.00	141.54	0.0
2400.000	92.15	0.00	0.00	140.30	235.00	143.10	0.0
12500.000	103.58	0.00	0.00	142.30	235.00	144.04	0.0
* 12600.000	96.79	0.00	0.00	144.80	235.00	146.95	0.0

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
 ----- WATERSHED 1 PRE-DEVELOPMENT
 99-33-01

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
10001.000	395.00	105.44	0.00	0.00	0.00	50.99	0.0
10002.000	395.00	105.65	0.00	0.21	0.00	60.19	28.3
10100.000	235.00	106.01	0.00	0.35	0.00	103.61	102.8

2H6V1338

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
10200.000	235.00	106.37	0.00	0.36	0.00	76.83	98.1
10300.000	235.00	107.82	0.00	1.45	0.00	85.74	102.1
10400.000	235.00	109.35	0.00	1.53	0.00	60.78	102.4
10500.000	235.00	110.36	0.00	1.01	0.00	70.75	97.6
* 10600.000	235.00	111.46	0.00	1.10	0.00	29.97	101.4
10700.000	235.00	114.22	0.00	2.76	0.00	46.10	105.2
10800.000	235.00	115.74	0.00	1.52	0.00	78.89	93.3
10900.000	235.00	116.49	0.00	0.75	0.00	103.91	90.8
11000.000	235.00	117.25	0.00	0.76	0.00	51.52	9
* 11100.000	235.00	119.57	0.00	2.33	0.00	47.08	97.2
11200.000	235.00	121.11	0.00	1.54	0.00	50.94	98.8
11300.000	235.00	122.53	0.00	1.42	0.00	67.86	100.8
11400.000	235.00	124.00	0.00	1.47	0.00	62.26	64.5
* 11500.000	235.00	126.16	0.00	2.16	0.00	167.43	170.4
11600.000	235.00	127.41	0.00	1.25	0.00	37.14	69.1
11700.000	235.00	129.71	0.00	2.30	0.00	105.95	106.6
* 11800.000	235.00	131.64	0.00	1.92	0.00	78.86	101.8
11900.000	235.00	133.84	0.00	2.20	0.00	108.54	89.1
12000.000	235.00	136.20	0.00	2.36	0.00	44.80	108.3
12100.000	235.00	137.30	0.00	1.10	0.00	69.30	85.5
12200.000	235.00	139.03	0.00	1.73	0.00	54.12	101.6
12300.000	235.00	141.54	0.00	2.51	0.00	59.96	9

2H6V1339

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/06/2000

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
12400.000	235.00	143.10	0.00	1.56	0.00	90.03	92.1
* 12500.000	235.00	144.04	0.00	0.93	0.00	83.67	103.5
12600.000	235.00	146.95	0.00	2.92	0.00	79.69	96.7

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 10100, profile 1, conveyance change outside acceptable range.

Section 10200, profile 1, conveyance change outside acceptable range.

Section 10600, profile 1, critical depth assumed.

Section 10600, profile 1, minimum specific energy.

Section 10700, profile 1, conveyance change outside acceptable range.

Section 10900, profile 1, conveyance change outside acceptable range.

Section 11000, profile 1, critical depth assumed.

Section 11000, profile 1, slope too steep.

Section 11000, profile 1, minimum specific energy.

Section 11100, profile 1, conveyance change outside acceptable range.

Section 11200, profile 1, conveyance change outside acceptable range.

Section 11400, profile 1, conveyance change outside acceptable range.

Section 11500, profile 1, conveyance change outside acceptable range.

Section 11600, profile 1, critical depth assumed.

Section 11600, profile 1, probable minimum specific energy.

Section 11600, profile 1, 20 trials attempted to balance water surface elevation.

Section 11700, profile 1, conveyance change outside acceptable range.

2H6V1340

BOSS RiverCAD HEC-2 Analysis version 4.0

PAG

PROJECT TITLE :--FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Section 11800, profile 1, conveyance change outside acceptable range.

Section 11900, profile 1, conveyance change outside acceptable range.

Section 12400, profile 1, conveyance change outside acceptable range.

Section 12500, profile 1, conveyance change outside acceptable range.

Section 12600, profile 1, conveyance change outside acceptable range.

22 Warning and status message(s) generated

END OF OUTPUT

2H6V1341

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=====

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Serial Number : 10120

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PROGRAM ORIGIN :

BOSS RiverCAD HEC-2 Analysis is an enhanced version of the U.S.
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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 2 PRE-DEVELOPMENT
ENGINEER : TIM EVERLY
DATE OF RUN : 5/08/2000
TIME OF RUN : 10:02 pm

2H6V1342

PROJECT TITLE :--FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

T1 99-33-01
T2 FOUR SEASONS IN HIST. VA. - FLOODPLAIN STUDY
T3 WATERSHED 2 PRE-DEVELOPMENT
T4 STARTING ELEVATION AT DOWNSTREAM CROSS SECTION 20100 OBTAINED FROM
T4 POWELLS CREEK WATERSHED STUDY

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q
	-10	2						177.2
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW
	-1		-1					-6

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 20100.000.

2H6V1343

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Section Number SECNO	Left Overbank Manning XNL	Channel Manning XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TWE (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONTR
20100.000	0.120	0.039	0.110	5.50	87.00	0.00	87.00
0.001178	0	0	0	87.06	0.06	0.00	0.00
0.00	74	13	83	0.00	82.00	82.00	0
177	58	46	72	77.2	1044.17	1121.33	0
0.00	0.79	3.41	0.87	0.000	0.0	81.50	0

STATUS: Analyzing cross-section reach 20200.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

2H6V1344

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
20800.000	0.130	0.035	0.110	3.65	107.15	107.15	0.00
0.026673	106	183	123	107.88	0.73	1.75	0.15
1.02	37	4	6	0.00	104.00	104.00	20
177	102	57	17	32.8	1055.96	1088.81	8
0.04	2.71	11.40	2.90	0.000	0.6	103.50	0

STATUS: Analyzing cross-section reach 20900.000.

20900.000	0.130	0.035	0.110	4.07	109.67	0.00	0.00
0.021147	95	112	101	110.29	0.61	2.40	0.01
1.13	34	4	10	0.00	106.00	106.00	2
177	99	49	27	25.2	1048.19	1073.37	0
0.05	2.88	10.97	2.76	0.000	0.7	105.60	

STATUS: Analyzing cross-section reach 21000.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

21000.000	0.130	0.035	0.110	3.43	111.93	111.93	0.00
0.021978	104	114	83	112.79	0.86	2.23	0.07
1.24	20	6	16	0.00	109.00	109.00	2
177	49	75	52	25.1	1076.66	1101.80	12
0.05	2.47	10.93	3.10	0.000	0.7	108.50	0

STATUS: Analyzing cross-section reach 21100.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.10

2H6V1345

5/08/2000

LCNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

21100.000	0.110	0.035	0.110	3.84	114.34	0.00	0.00
0.004994	187	196	150	114.49	0.15	1.63	0.07
1.50	37	7	41	0.00	111.00	111.00	4
177	64	43	69	40.0	1076.48	1116.51	0
0.07	1.73	5.61	1.68	0.000	0.8	110.50	0

STATUS: Analyzing cross-section reach 21200.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

21200.000	0.110	0.035	0.110	3.58	116.58	116.58	0.00
0.031983	66	73	62	117.16	0.58	0.69	0.13
1.59	31	3	10	0.00	113.50	113.50	20
177	99	40	37	37.3	1067.66	1104.99	12
0.07	3.21	11.20	3.73	0.000	0.9	113.00	0

STATUS: Analyzing cross-section reach 21300.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

21300.000	0.110	0.035	0.110	3.74	119.34	119.34	0.00
0.035344	85	70	68	120.09	0.74	2.59	0.05
1.67	18	3	17	0.00	116.10	116.10	2
177	64	45	67	25.6	1093.22	1118.80	8
0.08	3.54	12.12	3.88	0.000	1.0	115.60	0

STATUS: Analyzing cross-section reach 21400.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

2H6V1346

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
21400.000	0.110	0.035	0.110	4.15	121.65	121.65	0.00
0.014386	97	102	99	122.70	1.05	2.15	0.09
1.76	19	7	14	0.00	118.00	118.00	3
177	51	89	35	21.1	1063.34	1084.40	8
0.08	2.72	11.29	2.42	0.000	1.0	117.50	0

STATUS: Analyzing cross-section reach 21500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

21500.000	0.110	0.035	0.110	4.68	123.68	0.00	0.00
0.010354	81	98	106	123.94	0.26	1.16	0.08
1.88	23	4	32	0.00	119.50	119.50	2
177	61	35	80	29.9	1052.20	1082.12	0
0.09	2.65	7.62	2.44	0.000	1.1	119.00	0

STATUS: Analyzing cross-section reach 21600.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

21600.000	0.110	0.035	0.110	3.43	125.93	125.93	0.00
0.040980	96	100	106	126.68	0.75	1.86	0.15
1.99	18	3	15	0.00	123.00	123.00	20
177	72	42	62	22.5	1082.99	1105.51	16
0.09	3.91	12.31	4.16	0.000	1.1	122.50	0

STATUS: Analyzing cross-section reach 21700.000.

1700.000	0.110	0.035	0.110	3.36	129.86	0.00	0.00
0.025051	118	103	106	130.22	0.36	3.50	0.04
2.10	30	3	19	0.00	127.00	127.00	4
177	83	31	61	36.5	1093.79	1130.32	0
0.10	2.78	9.49	3.22	0.000	1.2	126.50	0

STATUS: Analyzing cross-section reach 21800.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

2H6V1347

180

5/08/2000

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

21800.000	0.110	0.035	0.110	3.21	133.71	133.71	0.00
0.038579	106	101	108	134.27	0.56	3.26	0.06
2.22	18	3	23	0.00	131.00	131.00	2
177	62	36	77	36.2	1156.32	1192.53	10
0.11	3.37	11.44	3.30	0.000	1.3	130.50	0

STATUS: Analyzing cross-section reach 21900.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

21900.000	0.110	0.035	0.110	3.73	137.23	137.23	0.00
0.022078	115	100	100	137.94	0.71	3.02	0.05
2.34	16	4	27	0.00	134.00	134.00	3
177	48	53	74	33.6	1201.30	1234.93	11
0.11	3.04	11.47	2.75	0.000	1.4	133.50	0

STATUS: Analyzing cross-section reach 22000.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

22000.000	0.110	0.035	0.110	3.87	140.37	140.37	0.00
0.033587	106	103	105	141.13	0.76	2.82	0.01
2.44	12	3	22	0.00	137.00	137.00	3
177	43	46	87	24.0	1087.37	1111.42	8
0.12	3.59	12.08	3.84	0.000	1.4	136.50	0

STATUS: Analyzing cross-section reach 22100.000.

22100.000	0.110	0.035	0.110	4.51	143.01	0.00	0.00
0.019150	97	94	94	143.53	0.52	2.38	0.02
2.54	18	4	26	0.00	139.00	139.00	2
177	64	45	67	32.5	1070.90	1103.42	0
0.12	3.49	10.11	2.58	0.000	1.5	138.50	0

STATUS: Analyzing cross-section reach 22200.000.

2H6V1348

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/20

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
22200.000	0.110	0.035	0.110	3.44	144.94	0.00	0.00
0.014478	92	103	102	145.19	0.25	1.63	0.03
2.66	25	3	28	0.00	141.90	141.90	3
177	71	27	79	29.3	1151.05	1180.39	0
0.13	2.84	7.87	2.78	0.000	1.6	141.50	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
 WATERSHED 2 PRE-DEVELOPMENT
 99-33-01

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Crit. W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRWS
20100.000	0.00	0.00	0.00	81.50	177.20	87.00	0.0
* 20200.000	112.32	0.00	0.00	84.20	177.20	87.98	87.9
* 20300.000	134.25	0.00	0.00	88.00	177.20	91.08	91.0
* 20400.000	173.21	0.00	0.00	91.50	177.20	95.36	95.3
* 20500.000	151.83	0.00	0.00	95.00	177.20	98.61	98.6
* 20600.000	107.47	0.00	0.00	97.50	177.20	101.62	101.6
* 20700.000	99.93	0.00	0.00	100.00	177.20	103.57	0.0
20800.000	183.11	0.00	0.00	103.50	177.20	107.15	107.1
20900.000	112.69	0.00	0.00	105.60	177.20	109.67	0.0

2H6V1349

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/03/2000

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRWS
* 21000.000	114.27	0.00	0.00	108.50	177.20	111.93	111.9
* 21100.000	196.81	0.00	0.00	110.50	177.20	114.34	0.0
* 21200.000	73.90	0.00	0.00	113.00	177.20	116.58	116.5
* 21300.000	70.98	0.00	0.00	115.60	177.20	119.34	119.3
* 21400.000	102.70	0.00	0.00	117.50	177.20	121.65	121.6
21500.000	98.75	0.00	0.00	119.00	177.20	123.68	0.0
* 21600.000	100.64	0.00	0.00	122.50	177.20	125.93	125.9
21700.000	103.39	0.00	0.00	126.50	177.20	129.86	0.0
21800.000	101.62	0.00	0.00	130.50	177.20	133.71	133.7
21900.000	100.98	0.00	0.00	133.50	177.20	137.23	137.2
* 22000.000	103.28	0.00	0.00	136.50	177.20	140.37	140.3
22100.000	94.62	0.00	0.00	138.50	177.20	143.01	0.0
22200.000	103.10	0.00	0.00	141.50	177.20	144.94	0.0

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
 ----- WATERSHED 2 PRE-DEVELOPMENT
 99-33-01

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
20100.000	177.20	87.00	0.00	0.00	0.00	77.17	0.0
* 20200.000	177.20	87.98	0.00	0.98	0.00	27.89	112.3

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FAG

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
* 20300.000	177.20	91.08	0.00	3.10	0.00	33.29	134.1
* 20400.000	177.20	95.36	0.00	4.28	0.00	52.38	173.1
* 20500.000	177.20	98.61	0.00	3.25	0.00	21.08	151.6
* 20600.000	177.20	101.62	0.00	3.01	0.00	21.00	107.4
* 20700.000	177.20	103.57	0.00	1.95	0.00	45.18	99.9
* 20800.000	177.20	107.15	0.00	3.58	0.00	32.85	183.1
20900.000	177.20	109.67	0.00	2.53	- 0.00	25.18	112.6
21000.000	177.20	111.93	0.00	2.26	0.00	25.14	1
* 21100.000	177.20	114.34	0.00	2.41	0.00	40.03	196.8
21200.000	177.20	116.58	0.00	2.25	0.00	37.33	73.9
* 21300.000	177.20	119.34	0.00	2.76	0.00	25.58	70.9
* 21400.000	177.20	121.65	0.00	2.31	0.00	21.07	102.7
21500.000	177.20	123.68	0.00	2.03	0.00	29.92	98.7
* 21600.000	177.20	125.93	0.00	2.25	0.00	22.52	100.6
21700.000	177.20	129.86	0.00	3.93	0.00	36.54	103.3
* 21800.000	177.20	133.71	0.00	3.85	0.00	36.21	101.6
21900.000	177.20	137.23	0.00	3.52	0.00	33.63	100.9
22000.000	177.20	140.37	0.00	3.14	0.00	24.04	103.2
22100.000	177.20	143.01	0.00	2.64	0.00	32.52	94.6
22200.000	177.20	144.94	0.00	1.93	0.00	29.33	103.1

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SUMMARY OF WARNING AND STATUS MESSAGES :

Section 20200, profile 1, critical depth assumed.

Section 20200, profile 1, probable minimum specific energy.

Section 20200, profile 1, 20 trials attempted to balance water surface elevation.

Section 20300, profile 1, critical depth assumed.

Section 20300, profile 1, minimum specific energy.

Section 20400, profile 1, critical depth assumed.

Section 20400, profile 1, minimum specific energy.

Section 20500, profile 1, critical depth assumed.

Section 20500, profile 1, probable minimum specific energy.

Section 20500, profile 1, 20 trials attempted to balance water surface elevation.

Section 20600, profile 1, critical depth assumed.

Section 20600, profile 1, probable minimum specific energy.

Section 20600, profile 1, 20 trials attempted to balance water surface elevation.

Section 20700, profile 1, conveyance change outside acceptable range.

Section 20800, profile 1, critical depth assumed.

Section 20800, profile 1, probable minimum specific energy.

Section 20800, profile 1, 20 trials attempted to balance water surface elevation.

Section 21000, profile 1, critical depth assumed.

Section 21000, profile 1, minimum specific energy.

Section 21100, profile 1, conveyance change outside acceptable range.

Section 21200, profile 1, critical depth assumed.

Section 21200, profile 1, probable minimum specific energy.

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Section 21200, profile 1, 20 trials attempted to balance water surface elevation.

Section 21300, profile 1, critical depth assumed.

Section 21300, profile 1, minimum specific energy.

Section 21400, profile 1, critical depth assumed.

Section 21400, profile 1, minimum specific energy.

Section 21600, profile 1, critical depth assumed.

Section 21600, profile 1, probable minimum specific energy.

Section 21600, profile 1, 20 trials attempted to balance water surface elevation.

Section 21800, profile 1, critical depth assumed.

Section 21800, profile 1, minimum specific energy.

Section 21900, profile 1, critical depth assumed.

Section 21900, profile 1, minimum specific energy.

Section 22000, profile 1, critical depth assumed.

Section 22000, profile 1, minimum specific energy.

36 Warning and status message(s) generated

END OF OUTPUT

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PROJECT TITLE : FOUR SEASONS

PROJECT NUMBER : 99-33-01

9/27/2002

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Version : 2000

PROGRAM ORIGIN :

BOSS RMS for AutoCAD HEC-2 Analysis uses the standard 4.6.2 version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 Program for water-surface profile computations. This HEC-2 program was released on September 1990, last updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS
PROJECT NUMBER : 99-33-01 PRE
DESCRIPTION : WATERSHED 3 POST-DEVELOPMENT
ENGINEER : ROBERT BUTLER
DATE OF RUN : 9/27/2002
TIME OF RUN : 1:22 pm

T1 99-33-01
T2 FOUR SEASONS
T3 WATERSHED 3 POST-DEVELOPMENT
T4 STARTING ELEVATION AT DOWNSTREAM CROSS SECTION 30001 OBTAINED FROM POWELLS CREEK WATERSHED STUDY

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	SPRT	METRIC	HVINS	Q	WSEL	FQ
		2						360.25	71.5	
J2	NPROF	IPLT	PREVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1		-1					-6		
NC	0.11	0.11	0.105	0.1	0.3					
X1	30001	14	1096.27	1766.59						
GR	80	1000	78	1020.49	76	1040.98		74	1061.67	72
1096.27										
GR	70	1137.1	72	1350.49	72	1427.39		70	1713.25	72
1766.59										
GR	74	1802.14	76	1831.84	78	1844.68		80	1855.33	
X1	30002	10	1045.18	1473.9	172.88	110.26		129.11		

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GR	82	1000	80	1014.64	78	1029.74	76	1045.18	74
1059.61									
GR	74	1425.9	76	1473.9	78	1490.18	80	1504.17	82
1518.16									
NC	0.11	0.11	0.105	0.1	0.3				
X1	30100	14	1050.08	1212.37	167.6	194.85	145.41		
GR	88	1000	96	1009.33	84	1018.71	82	1028.33	80
1038.95									
GR	78	1050.08	77	1065	77	1170	78	1212.37	80
1266.62									
GR	82	1311.7	84	1351.39	86	1383.92	88	1417.48	
X1	30200	20	1044.95	1174.08	89.33	106.59	101.38		
GR	94	1000	92	1006.87	90	1013.71	88	1020.54	86
1027.1									
GR	84	1033.61	82	1039.7	80	1044.95	78	1097.44	78
1136.91									
GR	78	1164.85	78	1168.04	80	1174.08	82	1180.25	84
1188.77									
GR	86	1205.18	88	1222.74	90	1237.84	92	1252.5	94
1268.67									
X1	30300	23	1060.39	1174.08	86.77	101	101.26		
GR	98	1000	96	1008.43	94	1017.04	92	1026	90
1034.95									
GR	88	1043.86	86	1051.89	84	1056.07	82	1060.39	80
1105.96									
GR	80	1131.41	80	1158.57	79	1163	80	1168.1	82
1174.08									
GR	84	1180.16	86	1186.03	88	1192.17	90	1198.14	92
1204.19									
GR	94	1211.61	96	1218.44	98	1224.64			
X1	30400	20	1057.76	1173.26	90.12	103.46	100		
GR	100	1000	98	1008.38	96	1016.58	94	1024.92	92
1033.38									
GR	90	1042.01	88	1049.58	86	1053.5	84	1057.76	82
1153.5									
GR	80.5	1165	82	1169.01	84	1173.26	86	1183.39	88
1201.02									
GR	90	1214.37	92	1225.39	94	1237.63	96	1254.46	98
1270									
NC	0.11	0.11	0.04						
X1	30500	22	1150.19	1169.08	99.46	107.83	114.82		
GR	102	1000	100	1008.72	98	1017.34	96	1025.96	94
1034.41									
GR	92	1041.47	90	1045.6	88	1049.66	86	1079.26	84
1150.19									
GR	82	1159.8	82	1164.1	84	1169.08	86	1174.85	88
1181.55									
GR	90	1186.44	92	1191.46	94	1194.98	96	1203.08	98
1211.63									
GR	100	1219.74	102	1227.79					
NC				0.1	0.3				
X1	30550	19	1159.92	1194.7	54.83	54.83	54.83		
X3	0							86	86
GR	100	1019.01	98	1027.82	96	1049.03	94	1065.77	92
1078.92									
GR	90	1092.43	88	1107.5	86	1159.92	84	1178.94	82.2
1193.49									
GR	84	1188.49	86	1194.7	88	1200.7	90	1208.15	92
1216.56									
GR	94	1224.74	96	1232.92	98	1241.49	100	1250.06	
X1	30600	24	1166.64	1173.6	114.89	103.91	102.26		
GR	104	1000	102	1010.12	100	1022.14	98	1035.12	96
1048.07									
GR	94	1055.4	92	1060.23	90	1072.76	88	1107.92	86
1159.21									
GR	84	1166.64	82	1167	82	1173.3	84	1173.6	86
1176.98									
GR	88	1180.31	90	1186	92	1193.16	94	1200.16	96
1206.89									

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GR	98	1213.94	100	1221.13	102	1228.87	104	1236.37	
X1	30700	24	1241.66	1243.85	112.03	91.84	93.75		
GR	104	1000	102	1030.61	100	1041.24	98	1064.18	96
1086.8									
GR	94	1109.6	92	1140.11	90	1184.61	88	1228.96	86
1235.48									
GR	84	1241.66	83	1242	83	1243.5	84	1243.85	86
1248.77									
GR	88	1253.63	90	1258.55	92	1263.44	94	1268.34	96
1273.23									
GR	98	1278.13	100	1283.14	102	1288.26	104	1293.38	
X1	30800	29	1172.19	1184.8	128.94	92.72	101.14		
GR	112	1000	110	1005.69	108	1011.38	106	1017.19	104
1024.82									
GR	102	1033.05	100	1042.45	98	1052.33	96	1059.77	96
1067.11									
GR	96	1072.76	94	1093.96	92	1116.42	90	1157.2	88
1172.19									
GR	85.5	1175	85.5	1175	85.5	1183	88	1184.8	90
1192.02									
GR	92	1198.69	94	1204.46	96	1210.17	100	1221.61	102
1228.54									
GR	104	1237.04	106	1245.51	110	1261.93	112	1268.91	
X1	30900	32	1182.38	1184.25	103.95	106.48	101.35		
GR	116	1000	114	1005.82	112	1011.72	110	1017.53	108
1023.35									
GR	106	1028.89	104	1032.82	102	1051.2	100	1062.24	98
1073.09									
GR	96	1089.61	94	1112.76	92	1135.86	90	1176.72	88
1182.38									
GR	86	1182.9	86	1183.8	88	1184.25	90	1188.56	92
1192.95									
GR	94	1197.23	96	1200.86	98	1204.3	100	1214.4	102
1224.08									
GR	104	1233.13	106	1242.33	108	1253.15	110	1264.97	112
1277.36									
GR	114	1294.09	116	1305.65					
NC				0.1	0.3				
X1	30950	24	1162.08	1182.83	50	50	50		
X2									
15								92	92
X3	0								
GR	110	1000	108	1017.1	106	1025.82	104	1034.21	102
1042.93									
GR	100	1051.7	98	1069.77	96	1089.78	94	1111.09	92
1162.08									
GR	90	1166.93	88	1171.78	88	1174.06	90	1178.27	92
1182.83									
GR	94	1187.04	96	1191.6	98	1194.52	100	1203.55	102
1213.23									
GR	104	1222.26	106	1230.67	108	1242.3	110	1253.92	
X1	31000	25	1166.79	1170.96	89.93	96.96	95.84		
GR	110	1000	108	1007.65	106	1015.31	104	1032.29	102
1042.61									
GR	100	1057.29	98	1074.49	96	1095.15	94	1115.66	92
1161.69									
GR	90	1166.79	89	1167.3	89	1170.4	90	1170.96	90
1170.96									
GR	92	1174.24	94	1177.76	96	1181.23	98	1184.76	100
1189.25									
GR	102	1205.06	104	1220.52	106	1239.16	108	1256.19	110
1279.73									
NC	0.14	0.14	0.052						
X1	31100	24	1176.26	1179.06	99.68	122.89	105.22		
GR	112	1000	110	1008.31	108	1016.63	106	1028.56	104
1041.71									
GR	102	1054.38	100	1079.47	98	1111.65	96	1141.75	94
1169.32									
GR	92	1176.26	89.5	1176.7	89.5	1178.6	92	1179.06	94
1186.93									

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GR	96	1201.58	98	1227.03	100	1255.68	102	1291.03	104
1311.53									
GR	106	1331.11	108	1350.74	110	1371.26	112	1393.44	
NC	0.09	0.09	0.035						
X1	31200	16	1130	1170	97.31	110.31	104.34		
GR	108	1000	106	1012.71	104	1029.35	102	1057.52	100
1074.91									
GR	97.4	1130	96	1131	96	1169	97.4	1170	97.4
1170									
GR	98	1173.87	100	1178.78	102	1183.89	104	1208.23	106
1225.45									
GR	108	1314.4							
NC	0.11	0.11	0.035						
X1	31300	23	1214	1216	88.05	102.34	99.82		
GR	120	1000	118	1015.03	116	1028.02	114	1039.49	112
1049.02									
GR	110	1058.87	108	1090.01	106	1106.54	104	1125.1	102
1162.48									
GR	100.3	1214	99.97	1214	99.97	1216	100.3	1216	102
1269.76									
GR	104	1280.24	106	1290.48	108	1300.86	110	1316.21	112
1331.91									
GR	114	1346.4	116	1357.85	118	1369.68			
X1	31400	32	1238	1240	53.08	128.43	90.18		
GR	124	1000	122	1012	120	1025.58	118	1038.79	116
1046.56									
GR	114	1054.53	112	1079.31	112	1095.44	112	1098.47	110
1116.92									
GR	108	1138.32	106	1160.07	104	1176.68	102	1201.64	101.9
1238									
GR	101.56	1238	101.56	1240	101.9	1240	102	1259.79	102
1278.22									
GR	102	1286.86	104	1300.87	106	1312.66	108	1322.42	110
1332.69									
GR	112	1343.76	114	1354.31	116	1365.29	118	1377.9	120
1391.38									
GR	122	1409.65	124	1422.62					
NC	0.1	0.1	0.052						
X1	31500	28	1226.24	1245.78	67.63	130.11	98.64		
GR	124	1000	122	1011.51	120	1020.02	118	1030.14	118
1030.23									
GR	118	1050.86	116	1075.13	114	1091.34	112	1107.4	110
1126.99									
GR	108	1149.48	106	1168.37	104	1186.48	104	1203.17	104
1226.24									
GR	102	1227	102	1245	104	1245.78	106	1247.11	108
1249.08									
GR	110	1254.8	112	1260.62	114	1266.43	116	1272.23	118
1278.12									
GR	120	1283.87	122	1289.6	124	1295.1			
X1	31600	30	1160.13	1182.13	110.26	88.09	130.04		
GR	130	1000	128	1006.34	126	1014.36	124	1025.61	122
1036.94									
GR	120	1048.12	118	1059.21	116	1070.3	114	1088.2	112
1107.12									
GR	110	1129.23	108	1153.28	106	1156.56	104	1160.13	102.5
1161									
GR	102.5	1181.26	104	1182.13	106	1185.51	108	1191.13	110
1204.18									
GR	112	1226.33	114	1240.53	116	1249.91	118	1259.29	120
1268.72									
GR	122	1277.47	124	1283.71	126	1290	128	1296.29	130
1302.6									
X1	31700	30	1157.01	1176.9	109.22	72.2	102.16		
GR	134	1000	132	1006.19	130	1012.97	128	1020.19	126
1036.82									
GR	124	1046.94	122	1056.78	120	1068.46	118	1084.03	116
1099.69									
GR	114	1120.91	112	1143.75	110	1153.02	108	1157.01	106
1157.8									

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GR	106	1176	108	1176.9	110	1190.31	112	1224.95	114
1244.8									
GR	116	1260.99	118	1272.09	120	1282.29	122	1291.92	124
1300									
GR	126	1308.02	128	1315.01	130	1322.53	132	1329.95	134
1337.45									
X1	31800	28	1182.48	1196.59	118.76	51.89	110.7		
GR	136	1000	134	1009.25	132	1019.37	130	1030.48	128
1041.74									
GR	126	1054.01	124	1056.37	122	1078.75	120	1085.56	118
1116.8									
GR	116	1140.83	114	1168.04	112	1182.48	110	1183.2	110
1195.9									
GR	112	1196.59	114	1212.12	116	1236.26	118	1256.92	120
1275.61									
GR	122	1291.51	124	1306.94	126	1317.89	128	1328.63	130
1339.06									
GR	132	1349.01	134	1358.12	136	1367			
X1	31900	28	1214.75	1230.2	136.68	64.44	122.36		
GR	138	1000	136	1016.6	134	1035.29	132	1053.99	130
1067.96									
GR	128	1082.15	126	1100.76	124	1120.73	122	1135.96	120
1152.49									
GR	118	1195.57	116	1209.72	114	1214.75	112	1215.5	112
1229.7									
GR	114	1230.2	116	1248.88	118	1263.42	120	1276.48	122
1289.33									
GR	124	1305	126	1317.32	128	1328.69	130	1340.06	132
1352.3									
GR	134	1365.54	136	1379.22	138	1393.06			
X1	32000	26	1258.05	1274.71	107.6	109.11	114.38		
GR	138	1000	136	1026.78	134	1059.3	132	1092.14	130
1110.9									
GR	128	1129.25	126	1147.12	124	1166.74	122	1194.43	120
1220.11									
GR	118	1248.99	116	1258.05	114.2	1259	114.2	1273.75	116
1274.71									
GR	118	1278.98	120	1286.79	122	1299.32	124	1308.46	126
1315.47									
GR	128	1322.58	130	1329.58	132	1336.49	134	1342.9	136
1349.54									
GR	138	1357.41							
X1	32050	23	1189.82	1207.61	51.49	51.5	51.18		
X3	0							118	118
GR	140	1000	138	1021.24	136	1032.95	134	1043.68	132
1057.06									
GR	130	1069.95	128	1084.31	126	1100.92	124	1115.85	122
1136.1									
GR	120	1156.75	118	1189.82	116	1195.97	115	1196.72	115
1204.51									
GR	116	1205.26	118	1207.61	120	1209.83	122	1225.58	124
1235.4									
GR	126	1244.94	128	1254.13	130	1263.17			
X1	32100	28	1190.47	1204.36	104.62	104.25	99.42		
GR	142	1000	140	1011.41	138	1022.82	136	1034.23	134
1047.85									
GR	132	1061.16	130	1073.24	128	1087.04	126	1106.29	124
1125.09									
GR	122	1148.91	120	1183.65	118	1190.47	116.2	1190.77	116.2
1204.06									
GR	118	1204.36	120	1206.86	122	1228.06	124	1239.14	126
1250.29									
GR	128	1264.35	130	1276.09	132	1287.39	134	1301.52	136
1315.61									
GR	138	1328.81	140	1344.85	142	1361.87			
NC	0.13	0.13	0.058						
X1	32200	29	1215.77	1217.89	94.59	99.74	103.7		
GR	144	1000	142	1009.29	140	1022.48	138	1038.07	136
1050.73									

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GR	132	1070.37	130	1089.34	128	1107.8	126	1129.57	124
1161.51									
GR	124	1206.83	124	1208.68	122	1212.07	120	1215.77	118.2
1216.07									
GR	118.4	1217.59	122	1217.89	122	1220.33	124	1222.79	126
1226.14									
GR	123	1236.81	130	1247.85	132	1259.86	134	1271.99	136
1284.29									
GR	138	1298.11	140	1315.34	142	1332.33	144	1350.82	
X1	32300	26	1159.6	1167.54	93.8	90.75	98.28		
GR	146	1000	144	1010.65	142	1019.97	140	1029.01	138
1038.19									
GR	136	1047.56	134	1056.83	132	1071.46	130	1086.8	128
1101.32									
GR	126	1156.4	124	1159.6	122.2	1159.9	122.2	1167.24	124
1167.54									
GR	126	1172.56	128	1176.42	130	1187.99	132	1199.93	134
1211.64									
GR	136	1221.16	138	1230.91	140	1242.17	142	1256.49	144
1269.62									
GR	146	1287.66							
X1	32400	22	1233.31	1243.99	79.94	136.03	139.37		
GR	146	1000	144	1015.05	142	1032.07	140	1046.6	138
1059.34									
GR	136	1071.95	134	1092.5	132	1117.24	130	1166.63	128
1233.31									
GR	126.2	1233.6	126.2	1243.7	128	1243.99	130	1247.79	132
1252.17									
GR	134	1268.4	136	1285.02	138	1300.43	140	1316.04	142
1333.22									
GR	144	1352.26	146	1392.03					

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30001.000.

STATUS: (3265) Divided flow.

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONT

30001.000	0.000	0.105	0.000	1.50	71.50	0.00	71.50
0.038536	0	0	0	71.52	0.02	0.00	0.00
0.00	0	333	0	0.00	72.00	72.00	0
360	0	360	0	445.1	1106.48	1753.26	0
0.00	0.00	1.08	0.00	0.000	0.0	70.00	0

STATUS: Analyzing cross-section reach 30002.000.

STATUS: (3235) The computed slope of the energy grade line exceeded 0.10, and critical depth has probably been crossed.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							0.23
30002.000	0.000	0.105	0.000	0.35	74.35	0.00	0.00
0.163920	172	129	110	74.47	0.12	2.92	0.03
0.68	0	127	0	0.00	76.00	76.00	3
360	0	360	0	369.0	1065.31	1434.35	0
0.01	0.00	2.82	0.00	0.000	1.2	74.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							3.88
30100.000	0.110	0.105	0.110	1.45	78.45	0.00	0.00
0.010909	167	145	194	78.49	0.05	4.01	0.01
1.25	0	206	2	0.00	78.00	78.00	6
360	0	358	1	177.0	1047.58	1224.56	0
0.04	0.52	1.74	0.52	0.000	2.1	77.00	0

STATUS: Analyzing cross-section reach 30200.000.

30200.000	0.000	0.105	0.000	1.73	79.73	0.00	0.00
0.015293	89	101	106	79.80	0.07	1.30	0.01
1.69	0	166	0	0.00	80.00	80.00	5
360	0	360	0	121.4	1051.84	1173.29	0
0.05	0.00	2.16	0.00	0.000	2.5	78.00	0

STATUS: Analyzing cross-section reach 30300.000.

30300.000	0.000	0.105	0.000	2.60	81.60	0.00	0.00
0.023557	86	101	101	81.71	0.11	1.90	0.01
2.04	0	137	0	0.00	82.00	82.00	4
360	0	360	0	103.5	1069.41	1172.90	0
0.06	0.00	2.62	0.00	0.000	2.7	79.00	0

STATUS: Analyzing cross-section reach 30400.000.

30400.000	0.000	0.105	0.000	3.50	84.00	0.00	0.00
0.024295	90	100	103	84.10	0.10	2.39	0.00
2.36	0	142	0	0.00	84.00	84.00	4
360	0	360	0	115.5	1057.79	1173.26	0
0.07	0.00	2.53	0.00	0.000	3.0	80.50	0

STATUS: Analyzing cross-section reach 30500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							1.56
30500.000	0.110	0.040	0.110	3.31	85.31	85.10	0.00
0.010006	99	114	107	85.96	0.65	1.69	0.17
2.65	30	48	2	0.00	84.00	84.00	6
360	31	326	2	69.4	1103.46	1172.88	11
0.08	1.02	6.79	0.99	0.000	3.2	82.00	0

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Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30550.000.

30550.000	0.000	0.040	0.000	3.82	86.02	0.00	0.00
0.019215	54	54	54	86.72	0.70	0.74	0.02
2.74	0	53	0	0.00	86.00	86.00	3
360	0	360	0	35.3	1159.45	1194.75	0
0.08	0.02	6.73	0.00	0.000	3.3	82.20	0

STATUS: Analyzing cross-section reach 30600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.46

30600.000	0.110	0.040	0.110	5.25	87.25	86.75	0.00
0.009026	114	102	103	88.07	0.82	1.31	0.04
2.90	36	35	8	0.00	84.00	84.00	6
360	54	289	16	51.8	1127.27	1179.05	11
0.08	1.49	8.08	1.82	0.000	3.4	82.00	0

STATUS: Analyzing cross-section reach 30700.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

30700.000	0.110	0.040	0.110	5.47	88.47	88.47	0.00
0.022974	112	93	91	89.52	1.06	1.34	0.07
3.08	33	11	24	0.00	84.00	84.00	2
360	123	142	94	36.2	1218.62	1254.78	8
0.09	3.70	12.27	3.85	0.000	3.5	83.00	0

STATUS: Analyzing cross-section reach 30800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.98

30800.000	0.110	0.040	0.110	4.54	90.04	0.00	0.00
0.005863	128	101	92	90.66	0.62	1.09	0.04
3.26	15	51	7	0.00	88.00	88.00	3
360	16	335	7	35.8	1156.34	1192.16	0
0.09	1.06	6.52	1.04	0.000	3.6	85.50	0

STATUS: Analyzing cross-section reach 30900.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

30900.000	0.110	0.040	0.110	6.03	92.03	92.03	0.00
0.030524	103	101	106	92.66	0.63	1.16	0.01
3.45	59	10	17	0.00	88.00	88.00	20
360	181	107	70	57.4	1135.56	1193.00	11
0.10	3.08	10.48	4.02	0.000	3.7	86.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30950.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.19

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30950.000	0.110	0.040	0.110	4.76	92.76	0.00	0.00
0.006389	50	50	50	93.27	0.52	0.60	0.01
3.54	7	61	0	0.00	92.00	92.00	2
360	4	355	0	41.5	1142.94	1184.41	0
0.10	0.56	5.81	0.53	0.000	3.8	88.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 30950.000
 Total Discharge (cfs, Q) 360
 Computed Water Surface Elevation (ft MSL, CWSEL) 92.76

Station (ft) =	1142.9	1162.1	1182.8	1184.4
Flow (%) =	1.1	98.8	0.1	
Area (sq ft) =	7.2	61.3	0.6	
Vel (ft/s) =	0.56	5.81	0.53	
Depth (ft) =	0.38	2.95	0.36	

STATUS: Analyzing cross-section reach 31000.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31000.000	0.110	0.040	0.110	5.20	94.20	94.20	0.00
0.010974	89	95	96	94.96	0.76	0.75	0.07
3.73	71	21	14	0.00	90.00	90.00	20
360	130	196	33	64.5	1113.63	1178.10	9
0.10	1.82	9.30	2.28	0.000	3.9	89.00	0

STATUS: Analyzing cross-section reach 31100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.68

31100.000	0.140	0.052	0.140	6.61	96.11	0.00	0.00
0.021496	99	105	122	96.51	0.40	1.52	0.04
3.99	52	17	40	0.00	92.00	92.00	4
360	120	133	106	62.8	1140.14	1202.94	0
0.11	2.31	7.70	2.61	0.000	4.0	89.50	0

STATUS: Analyzing cross-section reach 31200.000.

31200.000	0.090	0.035	0.090	1.58	97.58	0.00	0.00
0.011022	97	104	110	98.10	0.53	1.56	0.04
4.20	0	61	0	0.00	97.40	97.40	2
360	0	360	0	45.0	1126.15	1171.17	0
0.11	0.35	5.82	0.35	0.000	4.2	96.00	0

STATUS: Analyzing cross-section reach 31300.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31300.000	0.110	0.035	0.110	2.25	102.22	102.22	0.00
0.037583	88	99	102	102.62	0.41	1.82	0.01
4.40	55	4	57	0.00	100.30	100.30	20
360	150	52	157	112.5	1158.41	1270.90	14
0.12	2.72	11.68	2.73	0.000	4.3	99.97	0

STATUS: Analyzing cross-section reach 31400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.24

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31400.000	0.110	0.035	0.110	2.35	103.91	0.00	0.00
0.007492	53	90	128	103.98	0.07	1.32	0.03
4.74	94	4	103	0.00	101.90	101.90	4
360	156	25	178	122.5	1177.79	1360.25	0
0.13	1.66	5.35	1.73	0.000	4.6	101.56	0

STATUS: Analyzing cross-section reach 31500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.65

31500.000	0.100	0.052	0.100	2.62	104.62	104.51	0.00
0.017730	67	98	130	105.21	0.59	1.08	0.16
5.05	26	49	0	0.00	104.00	104.00	6
360	37	322	0	65.4	1190.84	1246.19	8
0.14	1.41	6.50	0.61	0.000	4.8	102.00	0

STATUS: Analyzing cross-section reach 31600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.83

31600.000	0.100	0.052	0.100	3.57	106.07	0.00	0.00
0.005315	110	130	88	106.38	0.32	1.14	0.03
5.28	3	77	3	0.00	104.00	104.00	2
360	3	352	3	29.2	1156.45	1195.69	0
0.15	1.03	4.57	1.02	0.000	4.9	102.50	0

STATUS: Analyzing cross-section reach 31700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31700.000	0.100	0.052	0.100	2.26	108.26	108.26	0.00
0.035508	109	102	72	109.34	1.07	1.13	0.23
5.43	0	43	0	0.00	108.00	108.00	20
360	0	360	0	22.2	1156.49	1178.65	14
0.15	0.03	8.32	0.72	0.000	5.0	106.00	0

STATUS: Analyzing cross-section reach 31800.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

31800.000	0.100	0.052	0.100	2.96	112.96	112.96	0.00
0.028886	118	110	51	114.09	1.13	3.52	0.02
5.54	3	40	3	0.00	112.00	112.00	3
360	5	349	5	28.5	1175.55	1204.04	11
0.15	1.54	8.66	1.54	0.000	5.0	110.00	0

STATUS: Analyzing cross-section reach 31900.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.62

31900.000	0.100	0.052	0.100	3.62	115.62	0.00	0.00
0.011071	136	122	64	116.19	0.57	2.04	0.06
5.70	3	54	12	0.00	114.00	114.00	2

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360	4	339	16	34.6	1210.65	1245.31	0
0.16	1.29	6.21	1.35	0.000	5.1	112.00	0

STATUS: Analyzing cross-section reach 32500.000.

32000.000	0.100	0.052	0.100	2.90	117.10	0.00	0.00
0.021137	107	114	109	117.99	0.83	1.70	0.10
5.85	2	46	1	0.00	116.00	116.00	3
360	3	354	1	24.0	1253.06	1277.06	0
0.16	1.43	7.61	1.36	0.000	5.2	114.20	0

STATUS: Analyzing cross-section reach 32050.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

32050.000	0.100	0.052	0.100	3.37	118.37	118.37	0.00
0.032499	51	51	51	119.49	1.12	1.33	0.07
5.91	1	42	0	0.00	118.00	118.00	3
360	0	359	0	24.3	1183.72	1208.02	11
0.17	0.87	8.52	0.03	0.000	5.2	115.00	0

STATUS: Analyzing cross-section reach 32100.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.05

32100.000	0.100	0.052	0.100	4.26	120.46	0.00	0.00
0.007704	104	99	104	120.94	0.48	1.39	0.06
6.05	11	58	4	0.00	118.00	118.00	3
360	17	337	5	36.2	1175.57	1211.79	0
0.17	1.46	5.74	1.20	0.000	5.3	116.20	0

STATUS: Analyzing cross-section reach 32200.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

32200.000	0.130	0.058	0.130	6.51	124.91	124.91	0.00
0.033654	94	103	99	125.46	0.55	1.42	0.02
6.24	70	13	14	0.00	120.00	120.00	20
360	180	124	55	77.3	1146.98	1224.31	16
0.18	2.56	9.31	3.71	0.000	5.4	116.40	0

STATUS: Analyzing cross-section reach 32300.000.

32300.000	0.130	0.058	0.130	4.86	127.06	126.55	0.00
0.018618	93	98	90	127.90	0.85	2.35	0.09
6.43	21	38	11	0.00	124.00	124.00	6
360	30	303	25	47.3	1127.33	1174.60	14
0.18	1.39	8.00	2.26	0.000	5.5	122.20	0

STATUS: Analyzing cross-section reach 32400.000.

32400.000	0.130	0.058	0.130	3.62	129.82	129.62	0.00
0.019948	79	139	136	130.43	0.61	2.50	0.02
6.64	55	38	3	0.00	128.00	128.00	4
360	83	272	4	74.8	1172.68	1247.45	16
0.19	1.51	7.14	1.40	0.000	5.7	126.20	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

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SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS
 ----- WATERSHED 3 POST-DEVELOPMENT
 99-33-01

Cross- Section Number Area (sq ft) SECNO AREA	Channel Index Q Reach (0.01 * Length Convey.) (ft) XLCH .01K	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 1CK*S	Channel Mean Flow Velocity (ft/s) VCH
30001.000 333.80	0.00 38.99	0.00	0.00	70.00	360.25	71.50	0.00	71.52	85.36	1.08
* 30002.000 127.62	129.11 8.90	0.00	0.00	74.00	360.25	74.35	0.00	74.47	1639.20	2.82
* 30100.000 209.86	145.41 34.49	0.00	0.00	77.00	360.25	78.45	0.00	78.49	109.09	1.74
30200.000 166.85	101.38 29.13	0.00	0.00	78.00	360.25	79.73	0.00	79.80	152.93	2.16
30300.000 137.60	101.26 23.47	0.00	0.00	79.00	360.25	81.60	0.00	81.71	235.57	2.62
30400.000 142.58	100.00 23.11	0.00	0.00	80.50	360.25	84.00	0.00	84.10	242.95	2.53
* 30500.000 81.37	114.82 36.01	0.00	0.00	82.00	360.25	85.31	85.10	85.96	100.06	6.79
30550.000 53.55	54.83 25.99	0.00	0.00	82.20	360.25	86.02	0.00	86.72	192.15	6.73
* 30600.000 81.30	102.26 37.92	0.00	0.00	82.00	360.25	87.25	86.75	88.07	90.26	8.08
* 30700.000 69.46	93.75 23.77	0.00	0.00	83.00	360.25	88.47	88.47	89.52	229.74	12.27
* 30800.000 74.68	101.14 47.05	0.00	0.00	85.50	360.25	90.04	0.00	90.66	58.63	6.52
* 30900.000 86.88	101.35 20.62	0.00	0.00	86.00	360.25	92.03	92.03	92.66	305.24	10.43
* 30950.000 69.07	50.00 45.07	0.00	0.00	88.00	360.25	92.76	0.00	93.27	63.89	5.81
* 31000.000 107.51	95.84 35.89	0.00	0.00	89.00	360.25	94.20	94.20	94.96	100.74	9.30
* 31100.000 110.29	105.22 24.57	0.00	0.00	89.50	360.25	96.11	0.00	96.51	214.96	7.70
31200.000 62.31	104.34 34.31	0.00	0.00	96.00	360.25	97.58	0.00	98.10	110.22	5.82
* 31300.000 117.47	99.82 18.58	0.00	0.00	99.97	360.25	102.22	102.22	102.62	375.83	11.68
* 31400.000 202.14	90.18 41.62	0.00	0.00	101.56	360.25	103.91	0.00	103.98	74.92	5.35
* 31500.000 76.34	98.64 27.06	0.00	0.00	102.00	360.25	104.62	104.51	105.21	177.30	6.50
* 31600.000 84.54	130.04 49.41	0.00	0.00	102.50	360.25	106.07	0.00	106.38	53.15	4.57

2H6V1365

PROJECT TITLE : FOUR SEASONS

PROJECT NUMBER : 99-33-01

9/27/2002

* 31700.000	102.16	0.00	0.00	106.00	360.25	106.26	106.26	109.34	355.08	8.32
43.58	19.12									
* 31800.000	110.70	0.00	0.00	110.00	360.25	112.96	112.96	114.09	288.86	9.66
47.26	21.20									
* 31900.000	120.36	0.00	0.00	112.00	360.25	115.62	0.00	116.19	110.71	6.21
70.15	34.24									
32000.000	114.38	0.00	0.00	114.20	360.25	117.10	0.00	117.99	211.37	7.61
50.66	24.78									
* 32050.000	51.18	0.00	0.00	115.00	360.25	118.37	118.37	119.49	324.99	8.52
43.38	19.98									
* 32100.000	99.42	0.00	0.00	116.20	360.25	120.46	0.00	120.94	77.04	5.74
75.38	41.04									
* 32200.000	103.70	0.00	0.00	118.40	360.25	124.91	124.91	125.46	336.54	9.31
98.73	19.64									
32300.000	98.28	0.00	0.00	122.20	360.25	127.06	126.55	127.90	186.18	8.00
71.33	26.40									
32400.000	139.37	0.00	0.00	126.20	360.25	129.82	129.62	130.43	199.48	7.14
96.40	25.51									

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS

WATERSHED 3 POST-DEVELOPMENT

99-33-01

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
30001.000	360.25	71.50	0.00	0.00	0.00	445.06	0.00
* 30002.000	360.25	74.35	0.00	2.85	0.00	369.03	129.11
* 30100.000	360.25	78.45	0.00	4.10	0.00	176.98	145.41
30200.000	360.25	79.73	0.00	1.28	0.00	121.45	101.38
30300.000	360.25	81.60	0.00	1.88	0.00	103.48	101.26
30400.000	360.25	84.00	0.00	2.40	0.00	115.47	100.00
* 30500.000	360.25	85.31	0.00	1.31	0.00	69.42	114.82
30550.000	360.25	86.02	0.00	0.70	0.00	35.30	54.83
* 30600.000	360.25	87.25	0.00	1.23	0.00	51.78	102.26
* 30700.000	360.25	88.47	0.00	1.22	0.00	36.15	93.75
* 30800.000	360.25	90.04	0.00	1.58	0.00	35.82	101.14
* 30900.000	360.25	92.03	0.00	1.98	0.00	57.44	101.35
* 30950.000	360.25	92.76	0.00	0.73	0.00	41.47	50.00
* 31000.000	360.25	94.20	0.00	1.44	0.00	64.47	95.84
* 31100.000	360.25	96.11	0.00	1.91	0.00	62.81	105.22
31200.000	360.25	97.58	0.00	1.47	0.00	45.02	104.34
* 31300.000	360.25	102.22	0.00	4.64	0.00	112.49	99.82
* 31400.000	360.25	103.91	0.00	1.69	0.00	122.46	90.18
* 31500.000	360.25	104.62	0.00	0.72	0.00	65.35	98.64

2H6V1366

9/27/2002

* 31600.000	360.25	106.07	0.00	1.44	0.00	29.24	130.04
* 31700.000	360.25	108.26	0.00	2.20	0.00	22.16	100.16
* 31800.000	360.25	112.96	0.00	4.70	0.00	28.50	110.70
* 31900.000	360.25	115.62	0.00	2.66	0.00	34.63	122.36
32000.000	360.25	117.10	0.00	1.48	0.00	24.00	114.38
* 32050.000	360.25	118.37	0.00	1.27	0.00	24.30	51.18
* 32100.000	360.25	120.46	0.00	2.09	0.00	36.22	99.42
* 32200.000	360.25	124.91	0.00	4.45	0.00	77.34	103.70
32300.000	360.25	127.06	0.00	2.15	0.00	47.27	98.28
32400.000	360.25	129.82	0.00	2.76	0.00	74.77	139.37

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 30002, profile 1, slope too steep.
 Section 30002, profile 1, conveyance change outside acceptable range.
 Section 30100, profile 1, conveyance change outside acceptable range.
 Section 30500, profile 1, conveyance change outside acceptable range.
 Section 30600, profile 1, conveyance change outside acceptable range.
 Section 30700, profile 1, critical depth assumed.
 Section 30700, profile 1, minimum specific energy.
 Section 30800, profile 1, conveyance change outside acceptable range.
 Section 30900, profile 1, critical depth assumed.
 Section 30900, profile 1, probable minimum specific energy.
 Section 30900, profile 1, 20 trials attempted to balance water surface elevation.
 Section 30950, profile 1, conveyance change outside acceptable range.
 Section 31000, profile 1, critical depth assumed.
 Section 31000, profile 1, probable minimum specific energy.
 Section 31000, profile 1, 20 trials attempted to balance water surface elevation.
 Section 31100, profile 1, conveyance change outside acceptable range.
 Section 31300, profile 1, critical depth assumed.
 Section 31300, profile 1, probable minimum specific energy.
 Section 31300, profile 1, 20 trials attempted to balance water surface elevation.
 Section 31400, profile 1, conveyance change outside acceptable range.
 Section 31500, profile 1, conveyance change outside acceptable range.
 Section 31600, profile 1, conveyance change outside acceptable range.
 Section 31700, profile 1, critical depth assumed.
 Section 31700, profile 1, probable minimum specific energy.
 Section 31700, profile 1, 20 trials attempted to balance water surface elevation.

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9/27/2002

Section 31800, profile 1, critical depth assumed.
Section 31800, profile 1, minimum specific energy.
Section 31900, profile 1, conveyance change outside acceptable range.
Section 32050, profile 1, critical depth assumed.
Section 32050, profile 1, minimum specific energy.
Section 32100, profile 1, conveyance change outside acceptable range.
Section 32200, profile 1, critical depth assumed.
Section 32200, profile 1, probable minimum specific energy.
Section 32200, profile 1, 20 trials attempted to balance water surface elevation.
34 Warning and status message(s) generated

END OF OUTPUT

2H6V1368

BOSS RiverCAD HEC-2 Analysis version 4.0
PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01

PAGE 1

5/08/2000

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BOSS RiverCAD (tm)

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Version : 4.0
Serial Number : 10120

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PROGRAM ORIGIN :

BOSS RiverCAD HEC-2 Analysis is an enhanced version of the U.S.
Army Corps of Engineers Hydrologic Engineering Center HEC-2 program
for water-surface profile computations. Program based upon the September
1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 4 PRE-DEVELOPMENT
ENGINEER : TIM EVERLY
DATE OF RUN : 5/08/2000
TIME OF RUN : 11:37 pm

2H6V1369

T1 99-33-01
 T2 FOUR SEASONS IN HIST. VA. - FLOODPLAIN STUDY
 T3 WATERSHED 4 PRE-DEVELOPMENT
 T4 FLOW REDUCTION AT CROSS SECTION 40100 TO ACCOUNT FOR RUNOFF FROM
 T4 WATERSHED 1

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q
	-10	2						848
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW
	-1		-1					-6

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 40001.000.

2H6V1370

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONIT
40001.000	0.110	0.040	0.110	3.61	92.61	0.00	92.61
0.015814	0	0	0	93.18	0.57	0.00	0.00
0.00	26	31	209	0.00	90.00	90.00	0
848	58	306	483	166.5	1018.56	1185.07	0
0.00	2.21	9.64	2.31	0.000	0.0	89.00	0

STATUS: Analyzing cross-section reach 40002.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

2H6V1371

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	1026.22
Right Encroachment Station (ft, STENCR)	1038.22
Encroachment Method (TYPE)	1
Width or Percent Target	12.000
Left Encroachment Elevation (ft, ELENCL)	102.00
Right Encroachment Elevation (ft, ELENCR)	102.00

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
40002.000	0.000	0.040	0.000	5.37	95.45	95.45	0.00
0.031280	55	65	173	98.14	2.69	2.08	0.63
0.51	0	64	0	0.00	102.00	102.00	20
848	0	847	0	12.0	1026.22	1038.22	11
0.00	0.00	13.16	0.00	0.000	0.3	90.08	0

STATUS: Special culvert analysis being performed.

 LVERT DESCRIPTION :

Number of Identical Culverts (CUNO)	2
Culvert Mannings n (CUNV)	0.015
Culvert Entrance Loss Coefficient (ENTLC)	0.300
Box Culvert Height (ft, RISE)	6.00
Box Culvert Opening Width (ft, SPAN)	6.00
Culvert Length (ft, CULVLN)	463.90
Culvert Opening Upstream Invert (ft MSL, ELCHU)	95.19
Culvert Opening Downstream Invert (ft MSL, ELCHD)	90.08
Roadway Length (ft, RDLEN)	20.00
Roadway Weir Flow Discharge Coefficient (COFQ)	2.50
Chart # 8 - box culvert with flared wingwalls, no inlet top edge bevel	
Scale # 1 - wingwalls flared 30 to 75 degrees	

2H6V1372

STATUS: Analyzing cross-section reach 40003.000.

SPECIAL CULVERT INLET CONTROL RESULTS :

Energy Grade Line Elevation for Inlet Control (ft MSL, EGIC)	105.36
Energy Grade Line Elevation for Outlet Control (ft MSL, EGOC)	104.05
Previous Computed Water Surface Elevation (ft MSL, PCWSE)	95.45
Top of Roadway Elevation (ft MSL, ELTRD)	130.00

STATUS: (3280) For cross-section 40003.00, ends have been extended vertically 2.42 feet in order to calculate the hydraulic cross-section properties.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)	3.30
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CULVERT ANALYSIS RESULTS :

Inlet Control Energy Grade Line Elevation (ft MSL, EGIC)	105.36
Outlet Control Energy Grade Line Elevation (ft MSL, EGOC)	104.05
Water Surface Drop Through Culvert (ft, H4)	7.22
Total Weir Flow (cfs, QWEIR)	0.
Total Culvert Flow (cfs, QCULV)	848.
Mean Channel Velocity (fps, VCH)	7.76
Culvert Opening Area (sq ft, ACULV)	72.0
Top of Roadway Elevation (ft MSL, ELTRD)	130.00
Roadway Weir Length (ft, WEIRLN)	0.0

2H6V1373

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	1063.00
Right Encroachment Station (ft, STENCR)	1075.00
Encroachment Method (TYPE)	1
Width or Percent Target	12.000
Left Encroachment Elevation (ft, ELENCL)	130.00
Right Encroachment Elevation (ft, ELENCR)	130.00

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
JOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
40003.000	0.000	0.030	0.110	9.23	104.42	0.00	0.00
0.002876	485	479	484	105.36	0.93	7.22	0.00
1.47	0	109	1	0.00	130.00	96.00	3
848	0	847	0	12.0	1063.00	1075.00	0
0.02	0.00	7.76	0.22	0.000	0.4	95.19	0

STATUS: Analyzing cross-section reach 40004.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 3.47

0004.000	0.110	0.030	0.110	10.25	105.45	0.00	0.00
0.000239	27	29	35	105.47	0.02	0.02	0.09
1.95	392	26	758	0.00	95.70	95.70	2
848	257	83	507	244.9	1051.87	1296.75	0
0.03	0.66	3.15	0.67	0.000	0.5	95.20	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 40100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.60

2H6V1374

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
40100.000	0.110	0.030	0.110	8.98	105.48	0.00	0.00
0.000278	102	80	130	105.50	0.02	0.03	0.00
4.69	344	19	469	0.00	97.00	97.00	2
547	216	55	275	229.3	1028.75	1258.03	0
0.07	0.63	2.86	0.59	0.000	1.2	96.50	0

STATUS: Analyzing cross-section reach 40200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.43

40200.000	0.100	0.046	0.100	6.54	105.54	0.00	0.00
0.001477	105	134	138	105.57	0.03	0.07	0.00
6.60	52	13	392	0.00	99.50	99.50	2
547	69	48	429	185.4	1019.08	1204.53	0
0.09	1.32	3.45	1.09	0.000	1.8	99.00	0

STATUS: Analyzing cross-section reach 40300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.21

40300.000	0.110	0.080	0.110	2.98	105.78	0.00	0.00
0.033151	102	120	106	106.09	0.31	0.44	0.08
7.35	40	23	86	0.00	103.00	103.00	2
547	130	163	253	119.0	1053.66	1172.69	0
0.10	3.17	6.81	2.92	0.000	2.2	102.80	0

STATUS: Analyzing cross-section reach 40400.000.

40400.000	0.110	0.080	0.110	2.18	108.38	0.00	0.00
0.019374	105	107	86	108.49	0.11	2.37	0.02
7.76	49	17	161	0.00	106.40	106.40	4
547	130	74	342	178.7	1033.88	1212.54	0
0.11	2.63	4.23	2.12	0.000	2.5	106.20	0

STATUS: Analyzing cross-section reach 40500.000.

2H6V1375

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/02/200

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

40500.000	0.110	0.090	0.110	2.54	109.49	0.00	0.0
0.011080	126	106	42	109.60	0.11	1.11	0.0
8.13	17	96	113	0.00	107.00	107.00	
547	32	311	202	150.6	1017.50	1168.06	
0.12	1.87	3.23	1.78	0.000	2.7	106.95	

STATUS: Analyzing cross-section reach 40600.000.

40600.000	0.110	0.090	0.110	3.85	110.84	0.00	0.00
0.012236	101	136	111	110.96	0.12	1.36	0.00
8.70	172	23	17	0.00	107.65	107.65	2
547	408	99	39	113.2	1036.12	1149.32	0
0.13	2.37	4.22	2.25	0.000	3.1	106.99	0

STATUS: Analyzing cross-section reach 40700.000.

40700.000	0.120	0.046	0.120	4.63	112.16	0.00	0.00
0.015406	101	102	100	112.39	0.23	1.39	0.03
9.20	109	10	90	0.00	108.20	108.20	2
547	244	83	219	133.5	1063.79	1197.25	0
0.14	2.23	8.32	2.41	0.000	3.4	107.53	0

STATUS: Analyzing cross-section reach 40800.000.

40800.000	0.120	0.046	0.120	4.55	113.28	0.00	0.00
0.009117	69	117	114	113.40	0.12	1.00	0.01
9.63	232	9	11	0.00	109.40	109.40	2
547	468	57	21	120.9	1060.97	1181.84	0
0.15	2.02	6.12	1.87	0.000	3.6	108.73	0

STATUS: Analyzing cross-section reach 40900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.62

40900.000	0.120	0.046	0.120	3.90	114.53	0.00	0.00
0.023897	88	145	120	114.78	0.26	1.34	0.04
10.10	173	8	6	0.00	111.30	111.30	2
547	461	71	13	121.4	1118.79	1240.21	0
0.16	2.66	8.94	2.30	0.000	3.8	110.63	0

STATUS: Analyzing cross-section reach 41000.000.

2H6V1376

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LITBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

41000.000	0.120	0.052	0.120	4.66	116.83	0.00	0.00
0.013699	87	203	132	116.91	0.08	2.11	0.02
10.67	6	2	236	0.00	116.00	116.00	2
547	5	7	534	150.9	1091.45	1242.32	0
0.17	0.80	3.09	2.26	0.000	4.2	112.17	0

STATUS: Analyzing cross-section reach 41100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.64

41100.000	0.120	0.052	0.120	3.78	119.10	0.00	0.00
0.033844	87	96	118	119.33	0.24	2.38	0.05
11.20	12	4	136	0.00	117.10	117.10	2
547	31	36	478	97.1	1053.19	1150.24	0
0.18	2.64	7.72	3.51	0.000	4.5	115.32	0

STATUS: Analyzing cross-section reach 41200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.55

41200.000	0.120	0.065	0.120	3.34	121.47	0.00	0.00
0.014144	110	128	103	121.56	0.09	2.22	0.01
11.69	71	6	167	0.00	118.50	118.50	3
547	160	34	352	149.1	1059.43	1208.54	0
0.19	2.23	5.02	2.11	0.000	4.8	118.13	0

STATUS: Analyzing cross-section reach 41300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.48

41300.000	0.120	0.065	0.120	2.87	122.52	0.00	0.00
0.006497	105	116	108	122.57	0.05	1.00	0.00
12.38	57	5	247	0.00	119.98	119.98	4
547	80	18	447	142.2	1054.95	1197.20	0
0.21	1.42	3.11	1.81	0.000	5.2	119.65	0

STATUS: Analyzing cross-section reach 41400.000.

2H6V1377

5/08/2000

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
41400.000	0.120	0.035	0.120	2.26	123.59	123.59	0.00
0.023808	89	156	96	124.18	0.59	1.19	0.16
12.92	5	17	150	0.00	122.00	122.00	3
547	9	181	356	132.0	1050.75	1182.74	16
0.22	1.62	10.19	2.38	0.000	5.5	121.33	0

STATUS: Analyzing cross-section reach 41500.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

41500.000	0.120	0.035	0.120	4.18	126.51	126.51	0.00
0.007877	99	125	104	127.40	0.89	1.46	0.09
13.33	106	42	13	0.00	123.00	123.00	20
547	152	379	14	106.9	1013.13	1120.04	14
0.22	1.43	9.03	1.07	0.000	5.8	122.33	0

STATUS: Analyzing cross-section reach 41600.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

41600.000	0.120	0.035	0.120	4.08	128.41	128.41	0.00
0.009018	127	190	94	129.43	1.02	1.41	0.04
13.80	28	41	70	0.00	125.00	125.00	3
547	48	391	107	82.2	1024.62	1106.79	5
0.23	1.72	9.51	1.54	0.000	6.0	124.33	0

STATUS: Analyzing cross-section reach 41700.000.

2H6V1378

5/08/20

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTENK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
41700.000	0.120	0.085	0.120	3.29	130.59	0.00	0.00
0.007183	85	167	149	130.67	0.09	1.16	0.09
14.42	143	69	67	0.00	127.40	127.40	2
547	215	225	106	150.5	1053.47	1203.95	0
0.25	1.50	3.26	1.58	0.000	6.4	127.30	0

STATUS: Analyzing cross-section reach 41800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.57

41800.000	0.120	0.085	0.120	2.63	132.03	0.00	0.00
0.022312	114	145	122	132.17	0.15	1.48	0.00
15.14	105	28	93	0.00	129.50	129.50	2
547	215	142	188	192.5	1055.28	1247.77	0
0.26	2.04	4.92	2.03	0.000	6.8	129.40	0

STATUS: Analyzing cross-section reach 41900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.66

41900.000	0.110	0.059	0.100	4.21	133.71	0.00	0.00
0.008081	96	182	123	133.82	0.11	1.65	0.00
15.80	27	25	192	0.00	131.00	131.00	3
547	46	115	384	136.1	1045.65	1181.79	0
0.27	1.70	4.54	1.99	0.000	7.3	129.50	0

STATUS: Analyzing cross-section reach 42000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.54

2H6V1379

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/200

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
42000.000	0.110	0.059	0.100	3.17	135.37	0.00	0.00
0.027242	115	218	97	135.64	0.26	1.77	0.05
16.36	100	19	55	0.00	133.70	133.70	1
547	274	133	138	142.2	1054.14	1196.36	0
0.28	2.73	6.92	2.51	0.000	7.6	132.20	0

STATUS: Analyzing cross-section reach 42100.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

42100.000	0.110	0.039	0.100	3.25	137.58	137.58	0.00
0.014225	115	99	99	138.18	0.60	2.01	0.10
16.79	55	26	93	0.00	135.00	135.00	2
547	83	238	224	134.9	1087.48	1222.41	5
0.29	1.50	9.06	2.41	0.000	8.0	134.33	0

STATUS: Analyzing cross-section reach 42200.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

42200.000	0.110	0.039	0.100	3.75	139.58	139.58	0.00
0.011541	97	160	116	140.23	0.65	1.71	0.02
17.28	58	30	92	0.00	136.50	136.50	1
547	92	273	181	145.1	1058.58	1203.68	11
0.30	1.58	8.98	1.96	0.000	8.3	135.83	0

STATUS: Analyzing cross-section reach 42300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

1.49

2H6V1380

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AFOB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

42300.000	0.100	0.039	0.110	3.68	140.96	0.00	0.00
0.005206	114	162	96	141.22	0.26	0.95	0.04
17.82	38	31	175	0.00	138.00	137.28	2
547	44	201	301	132.1	1123.46	1255.60	0
0.31	1.17	6.37	1.71	0.000	8.7	137.28	0

STATUS: Analyzing cross-section reach 42400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.59

42400.000	0.100	0.039	0.110	2.60	141.73	0.00	0.00
0.014979	149	110	63	141.90	0.17	0.67	0.01
18.24	26	9	187	0.00	139.80	139.80	2
547	44	68	433	151.9	1040.15	1192.07	0
0.31	1.65	7.26	2.31	0.000	8.9	139.13	0

STATUS: Analyzing cross-section reach 42500.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

12500.000	0.100	0.039	0.110	2.64	143.27	143.27	0.00
0.021028	119	127	79	143.78	0.51	1.63	0.10
18.65	14	18	151	0.00	141.30	141.30	3
547	24	178	344	150.0	1031.20	1181.16	8
0.32	1.72	9.49	2.28	0.000	9.2	140.63	0

STATUS: Analyzing cross-section reach 42600.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

2H6V1381

214

5/08/2000

ECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

42600.000	0.100	0.039	0.110	2.95	145.28	145.28	0.00
0.015929	113	99	85	145.81	0.53	1.68	0.01
19.03	16	23	147	0.00	143.00	143.00	1
547	36	214	295	141.7	1034.43	1176.16	8
0.33	2.17	8.99	2.00	0.000	9.5	142.33	0

STATUS: Analyzing cross-section reach 42700.000.

42700.000	0.100	0.039	0.110	3.34	146.87	0.00	0.00
0.013410	82	108	124	147.43	0.56	1.61	0.01
19.51	67	26	82	0.00	144.30	144.30	2
547	162	237	147	129.7	1031.05	1160.80	0
0.33	2.39	8.82	1.78	0.000	9.9	143.53	0

STATUS: Analyzing cross-section reach 42800.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

42800.000	0.100	0.039	0.110	2.87	148.60	148.60	0.00
0.017997	54	130	144	149.21	0.61	1.55	0.01
19.86	121	23	12	0.00	146.40	146.40	0
547	301	219	26	111.9	1063.47	1175.41	15
0.34	2.47	9.41	2.14	0.000	10.2	145.73	0

STATUS: Analyzing cross-section reach 42900.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

2900.000	0.100	0.039	0.110	3.52	150.25	150.25	0.00
0.012283	80	116	116	150.85	0.60	1.50	0.00
20.23	76	28	81	0.00	147.40	147.40	3
547	151	253	142	134.7	1022.06	1156.80	11
0.34	1.96	8.88	1.74	0.000	10.4	146.73	0

STATUS: Analyzing cross-section reach 43000.000.

2H6V1382

PROJECT TITLE : FOUR SEASONS DIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2002

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
43000.000	0.100	0.039	0.110	4.61	151.92	0.00	0.00
0.009550	94	108	110	152.03	0.11	1.13	0.05
20.75	93	5	148	0.00	147.98	147.98	2
547	213	37	295	137.2	1024.83	1162.01	0
0.35	2.29	6.50	1.99	0.000	10.7	147.31	0

STATUS: Analyzing cross-section reach 43100.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

43100.000	0.100	0.039	0.110	2.85	153.18	153.18	0.00
0.012377	140	100	99	153.85	0.67	1.17	0.17
21.19	39	23	13	0.00	151.00	151.00	20
276	63	187	24	72.2	1097.40	1169.60	14
0.36	1.61	7.88	1.75	0.000	11.0	150.33	0

STATUS: Analyzing cross-section reach 43200.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

43200.000	0.100	0.039	0.110	3.06	154.89	154.89	0.00
0.010466	61	123	139	155.47	0.59	1.32	0.01
21.40	14	24	53	0.00	152.50	152.50	2
276	20	184	71	91.9	1040.80	1132.72	8
0.37	1.45	7.46	1.34	0.000	11.2	151.83	0

STATUS: Analyzing cross-section reach 43300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

0.59

2H6V1383

216

5/08/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
43300.000	0.100	0.059	0.100	3.75	157.18	157.00	0.00
0.030064	104	126	122	157.49	0.31	1.99	0.03
21.64	34	7	40	0.00	154.10	154.10	6
276	113	60	102	87.6	1034.25	1121.85	11
0.37	3.33	7.71	2.50	0.000	11.5	153.43	0

STATUS: Analyzing cross-section reach 43400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.19

43400.000	0.100	0.059	0.100	3.69	158.72	0.00	0.00
0.006274	88	133	122	158.78	0.06	1.27	0.03
21.92	105	7	44	0.00	155.70	155.70	3
276	163	26	85	118.2	1024.42	1142.58	0
0.39	1.55	3.49	1.91	0.000	11.7	155.03	0

STATUS: Analyzing cross-section reach 43500.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

43500.000	0.100	0.059	0.100	2.35	160.48	160.48	0.00
0.057054	97	209	104	160.71	0.23	1.62	0.05
22.23	15	4	72	0.00	158.80	158.80	4
276	58	37	179	154.6	1018.64	1173.24	21
0.40	3.66	7.76	2.48	0.000	12.0	158.13	0

STATUS: Analyzing cross-section reach 43600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.11

43600.000	0.100	0.059	0.100	3.32	162.95	0.00	0.00
0.012855	98	96	97	163.03	0.08	2.31	0.02
22.50	9	6	127	0.00	160.30	160.30	7
276	21	32	222	136.5	1020.77	1157.27	0
0.41	2.24	4.65	1.75	0.000	12.4	159.63	0

STATUS: Analyzing cross-section reach 43700.000.

2H6V1384

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/200

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.56

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
13700.000	0.100	0.059	0.100	2.88	165.21	0.00	0.00
0.041711	103	153	109	165.52	0.32	2.42	0.07
22.77	42	6	21	0.00	163.00	163.00	3
276	147	45	83	57.4	1078.35	1135.78	0
0.42	3.47	7.61	3.79	0.000	12.6	162.33	0

STATUS: Analyzing cross-section reach 43800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.62

43800.000	0.100	0.059	0.100	2.76	168.07	0.00	0.00
0.015949	104	126	105	168.17	0.10	2.62	0.00
23.00	77	5	38	0.00	165.98	165.98	3
276	152	24	98	100.9	1081.80	1182.72	0
0.43	1.97	4.48	2.57	0.000	12.8	165.31	0

STATUS: Analyzing cross-section reach 43900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.49

3900.000	0.100	0.059	0.100	2.87	169.20	0.00	0.00
0.007180	105	124	102	169.26	0.05	1.09	0.00
23.33	38	6	109	0.00	167.00	167.00	5
276	66	18	191	97.1	1028.88	1126.03	0
0.45	1.74	3.15	1.75	0.000	13.0	166.33	0

STATUS: Analyzing cross-section reach 44000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.43

2H6V1385

218

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
44000.000	0.100	0.059	0.100	2.40	170.53	0.00	0.00
0.038147	98	113	100	170.71	0.18	1.41	0.04
23.62	39	5	50	0.00	168.80	168.80	1
276	123	32	119	115.2	1036.05	1151.26	0
0.46	3.13	6.45	2.39	0.000	13.3	168.13	0

STATUS: Analyzing cross-section reach 44100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

2.04

44100.000	0.100	0.059	0.100	2.92	172.35	0.00	0.00
0.009184	100	117	100	172.41	0.06	1.69	0.01
23.91	67	6	82	0.00	170.10	170.10	4
276	114	21	139	121.0	1065.64	1186.65	0
0.47	1.69	3.60	1.69	0.000	13.6	169.43	0

STATUS: Analyzing cross-section reach 44200.000.

44200.000	0.100	0.059	0.100	3.07	173.40	0.00	0.00
0.012977	81	101	116	173.49	0.09	1.07	0.01
24.23	71	6	50	0.00	171.00	171.00	3
276	150	28	96	108.0	1046.72	1154.77	0
0.48	2.12	4.43	1.93	0.000	13.8	170.33	0

STATUS: Analyzing cross-section reach 44300.000.

44300.000	0.100	0.059	0.100	2.56	174.89	0.00	0.00
0.016357	97	102	109	174.98	0.09	1.50	0.00
24.53	52	5	67	0.00	173.00	173.00	3
276	115	23	136	113.8	1049.28	1163.07	0
0.50	2.22	4.41	2.04	0.000	14.1	172.33	0

STATUS: Analyzing cross-section reach 44400.000.

44400.000	0.090	0.063	0.100	2.35	176.88	0.00	0.00
0.022535	104	107	104	177.00	0.12	2.00	0.01
24.81	65	4	34	0.00	175.20	175.20	4
276	165	22	88	98.9	1091.21	1190.11	0
0.51	2.54	4.57	2.58	0.000	14.3	174.53	0

STATUS: Analyzing cross-section reach 44500.000.

2H6V1386

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
44500.000	0.090	0.063	0.100	2.84	179.17	0.00	0.00
0.017189	113	144	113	179.27	0.10	2.27	0.00
25.10	20	5	94	0.00	177.00	177.00	3
276	56	26	192	117.2	1097.40	1214.60	0
0.52	2.73	4.53	2.04	0.000	14.6	176.33	0

STATUS: Analyzing cross-section reach 44600.000.

44600.000	0.090	0.063	0.100	3.58	180.81	0.00	0.00
0.015017	92	102	112	180.97	0.16	1.68	0.02
25.36	37	7	47	0.00	177.90	177.90	2
276	116	37	122	64.1	1068.51	1132.65	0
0.53	3.14	4.95	2.60	0.000	14.8	177.23	0

STATUS: Analyzing cross-section reach 44700.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.71

44700.000	0.080	0.080	0.080	1.70	181.90	0.00	0.00
0.005113	96	116	145	181.95	0.05	0.97	0.01
25.70	13	128	14	0.00	180.30	180.30	3
276	15	243	16	111.3	1072.83	1184.17	0
0.55	1.14	1.89	1.14	0.000	15.1	180.20	0

STATUS: Analyzing cross-section reach 44800.000.

STATUS: (3235) The computed slope of the energy grade line exceeded 0.10, and critical depth has probably been crossed.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

2H6V1387

5/08/200

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LITBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
44800.000	0.000	0.110	0.000	1.47	183.48	183.48	0.00
0.200702	107	92	88	183.86	0.38	1.41	0.10
25.93	0	55	0	0.00	183.90	183.90	20
276	0	275	0	74.8	1092.71	1167.47	15
0.55	0.00	4.96	0.00	0.000	15.3	182.01	0

STATUS: Analyzing cross-section reach 44900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 5.14

44900.000	0.110	0.050	0.110	3.23	186.06	0.00	0.00
0.007603	108	105	95	186.12	0.05	2.23	0.03
26.22	115	6	62	0.00	183.50	183.50	9
276	159	27	88	152.6	1047.48	1200.10	0
0.57	1.38	4.14	1.41	0.000	15.6	182.83	0

STATUS: Analyzing cross-section reach 45000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.49

15000.000	0.110	0.050	0.110	2.94	187.54	0.00	0.00
0.031621	149	106	84	187.86	0.32	1.66	0.08
26.60	46	6	30	0.00	185.10	185.10	5
276	127	52	95	72.5	1051.65	1124.18	0
0.58	2.74	8.54	3.10	0.000	15.9	184.60	0

STATUS: Analyzing cross-section reach 45100.000.

15100.000	0.110	0.050	0.110	3.95	190.25	0.00	0.00
0.019773	115	103	96	190.50	0.25	2.63	0.01
26.82	49	6	38	0.00	186.80	186.80	4
276	124	48	102	66.3	1085.57	1151.92	0
0.59	2.50	7.72	2.67	0.000	16.1	186.30	0

STATUS: Analyzing cross-section reach 45200.000.

2H6V1388

221

5/08/2

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EC	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

45200.000	0.110	0.050	0.110	4.38	192.18	0.00	0.00
0.017183	122	108	90	192.44	0.26	1.94	0.00
27.05	28	6	62	0.00	188.30	188.30	3
276	78	53	143	67.7	1062.24	1129.93	0
0.60	2.73	7.72	2.31	0.000	16.2	187.80	0

STATUS: Analyzing cross-section reach 45300.000.

45300.000	0.110	0.050	0.110	3.11	194.11	0.00	0.00
0.018586	90	93	112	194.26	0.15	1.81	0.01
27.30	57	4	48	0.00	191.50	191.50	2
276	131	31	112	86.1	1025.17	1111.30	0
0.61	2.28	6.39	2.33	0.000	16.4	191.00	0

STATUS: Analyzing cross-section reach 45400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.63

45400.000	0.110	0.050	0.110	2.97	196.87	0.00	0.00
0.046409	85	109	131	197.28	0.41	2.94	0.08
27.52	43	4	22	0.00	194.40	194.40	3
276	145	46	84	53.9	1027.94	1081.82	0
0.61	3.35	9.78	3.82	0.000	16.6	193.90	0

STATUS: Analyzing cross-section reach 45500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.73

45500.000	0.110	0.050	0.110	3.09	199.59	0.00	0.00
0.015555	110	115	78	199.74	0.15	2.43	0.03
27.71	37	4	59	0.00	197.00	197.00	4
276	95	28	152	58.3	1023.68	1082.02	0
0.62	2.57	5.82	2.56	0.000	16.7	196.50	0

STATUS: Analyzing cross-section reach 45600.000.

2H6V1389

5/03/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
45600.000	0.120	0.040	0.120	3.34	201.04	0.00	0.00
0.013562	118	103	73	201.21	0.17	1.46	0.01
27.96	88	5	21	0.00	198.20	198.20	4
276	193	38	43	66.1	1039.99	1106.12	0
0.63	2.19	7.15	2.07	0.000	16.8	197.70	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
 WATERSHED 4 PRE-DEVELOPMENT
 99-33-01

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS
40001.000	0.00	0.00	0.00	89.00	848.00	92.61	0.0
* 40002.000	65.85	0.00	0.00	90.08	848.00	95.45	95.4
40003.000	479.12	130.00	0.00	95.19	848.00	104.42	0.0
* 40004.000	29.46	0.00	0.00	95.20	848.00	105.45	0.0
40100.000	80.40	0.00	0.00	96.50	547.00	105.48	0.0
40200.000	134.51	0.00	0.00	99.00	547.00	105.54	0.0
* 40300.000	120.40	0.00	0.00	102.80	547.00	105.78	0.0
40400.000	107.67	0.00	0.00	106.20	547.00	108.38	0.0
40500.000	106.92	0.00	0.00	106.95	547.00	109.49	0.0

2H6V1390

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/20

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLCD	ELMIN	Q	CWSEL	CRISW
40600.000	136.61	0.00	0.00	106.99	547.00	110.84	0.0
40700.000	102.69	0.00	0.00	107.53	547.00	112.16	0.0
40800.000	117.74	0.00	0.00	108.73	547.00	113.28	0.0
* 40900.000	145.79	0.00	0.00	110.63	547.00	114.53	0.0
41000.000	203.13	0.00	0.00	112.17	547.00	116.83	0.0
* 41100.000	96.15	0.00	0.00	115.32	547.00	119.10	0.0
* 41200.000	128.14	0.00	0.00	118.13	547.00	121.47	0.0
* 41300.000	116.79	0.00	0.00	119.65	547.00	122.52	0.0
* 41400.000	156.97	0.00	0.00	121.33	547.00	123.59	123
* 41500.000	125.65	0.00	0.00	122.33	547.00	126.51	126.5
* 41600.000	190.03	0.00	0.00	124.33	547.00	128.41	128.4
41700.000	167.20	0.00	0.00	127.30	547.00	130.59	0.0
41800.000	145.14	0.00	0.00	129.40	547.00	132.03	0.0
* 41900.000	182.87	0.00	0.00	129.50	547.00	133.71	0.0
42000.000	218.34	0.00	0.00	132.20	547.00	135.37	0.0
* 42100.000	99.54	0.00	0.00	134.33	547.00	137.58	137.5
42200.000	160.32	0.00	0.00	135.83	547.00	139.58	139.5
42300.000	162.37	0.00	0.00	137.28	547.00	140.96	0.0
* 42400.000	110.63	0.00	0.00	139.13	547.00	141.73	0.0
42500.000	127.74	0.00	0.00	140.63	547.00	143.27	143.2
* 42600.000	99.86	0.00	0.00	142.33	547.00	145.28	145.2
42700.000	108.33	0.00	0.00	143.53	547.00	146.87	0

2H6V1391

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRWS
* 42800.000	130.99	0.00	0.00	145.73	547.00	148.60	148.6
* 42900.000	116.96	0.00	0.00	146.73	547.00	150.25	150.2
43000.000	108.27	0.00	0.00	147.31	547.00	151.92	0.0
* 43100.000	100.00	0.00	0.00	150.33	276.00	153.18	153.1
* 43200.000	123.23	0.00	0.00	151.83	276.00	154.89	154.8
* 43300.000	126.68	0.00	0.00	153.43	276.00	157.18	157.0
* 43400.000	133.22	0.00	0.00	155.03	276.00	158.72	0.0
* 43500.000	209.08	0.00	0.00	158.13	276.00	160.48	160.4
* 43600.000	96.45	0.00	0.00	159.63	276.00	162.95	0.0
43700.000	153.40	0.00	0.00	162.33	276.00	165.21	0.0
* 43800.000	126.60	0.00	0.00	165.31	276.00	168.07	0.0
* 43900.000	124.00	0.00	0.00	166.33	276.00	169.20	0.0
44000.000	113.83	0.00	0.00	168.13	276.00	170.53	0.0
* 44100.000	117.75	0.00	0.00	169.43	276.00	172.35	0.0
44200.000	101.00	0.00	0.00	170.33	276.00	173.40	0.0
44300.000	102.38	0.00	0.00	172.33	276.00	174.89	0.0
44400.000	107.35	0.00	0.00	174.53	276.00	176.88	0.0
44500.000	144.23	0.00	0.00	176.33	276.00	179.17	0.0
44600.000	102.66	0.00	0.00	177.23	276.00	180.81	0.0
44700.000	116.36	0.00	0.00	180.20	276.00	181.90	0.0
* 44800.000	92.46	0.00	0.00	182.01	276.00	183.48	183.4
44900.000	105.03	0.00	0.00	182.83	276.00	186.06	0.0

2H6V1392

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/20

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRISW

* 45000.000	106.98	0.00	0.00	184.60	276.00	187.54	0.0
45100.000	103.99	0.00	0.00	186.30	276.00	190.25	0.0
45200.000	108.28	0.00	0.00	187.80	276.00	192.18	0.0
45300.000	93.52	0.00	0.00	191.00	276.00	194.11	0.0
* 45400.000	109.77	0.00	0.00	193.90	276.00	196.87	0.0
* 45500.000	115.38	0.00	0.00	196.50	276.00	199.59	0.0
45600.000	103.58	0.00	0.00	197.70	276.00	201.04	0.0

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

----- WATERSHED 4 PRE-DEVELOPMENT
99-33-01

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH

40001.000	848.00	92.61	0.00	0.00	0.00	166.51	0.0
* 40002.000	848.00	95.45	0.00	2.84	0.00	12.00	65.8
* 40003.000	848.00	104.42	0.00	8.97	0.00	12.00	479.1
* 40004.000	848.00	105.45	0.00	1.02	0.00	244.88	29.4
* 40100.000	547.00	105.48	0.00	0.03	0.00	229.28	80.4
* 40200.000	547.00	105.54	0.00	0.06	0.00	185.45	134.5
* 40300.000	547.00	105.78	0.00	0.24	0.00	119.03	120.4
40400.000	547.00	108.38	0.00	2.60	0.00	178.65	107.6

2H6V1393

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/200

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channe Reach Length (ft) XLCH
SECNO							
40500.000	547.00	109.49	0.00	1.11	0.00	150.56	106
40600.000	547.00	110.84	0.00	1.35	0.00	113.19	136
40700.000	547.00	112.16	0.00	1.31	0.00	133.46	102
40800.000	547.00	113.28	0.00	1.13	0.00	120.87	117
* 40900.000	547.00	114.53	0.00	1.25	0.00	121.41	145
41000.000	547.00	116.83	0.00	2.30	0.00	150.87	203
* 41100.000	547.00	119.10	0.00	2.27	0.00	97.05	96
* 41200.000	547.00	121.47	0.00	2.38	0.00	149.11	128
* 41300.000	547.00	122.52	0.00	1.05	0.00	142.24	116
41400.000	547.00	123.59	0.00	1.07	0.00	131.99	156
* 41500.000	547.00	126.51	0.00	2.92	0.00	106.92	125
* 41600.000	547.00	128.41	0.00	1.90	0.00	82.17	190
41700.000	547.00	130.59	0.00	2.17	0.00	150.48	167
* 41800.000	547.00	132.03	0.00	1.44	0.00	192.49	145
41900.000	547.00	133.71	0.00	1.68	0.00	136.14	182
* 42000.000	547.00	135.37	0.00	1.66	0.00	142.22	218
42100.000	547.00	137.58	0.00	2.21	0.00	134.94	99
42200.000	547.00	139.58	0.00	2.00	0.00	145.10	160
* 42300.000	547.00	140.96	0.00	1.38	0.00	132.14	162
42400.000	547.00	141.73	0.00	0.77	0.00	151.92	110
* 42500.000	547.00	143.27	0.00	1.54	0.00	149.96	127
42600.000	547.00	145.28	0.00	2.01	0.00	141.73	99

2H6V1394

227

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2001

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
42700.000	547.00	146.87	0.00	1.59	0.00	129.75	108.3
* 42800.000	547.00	148.60	0.00	1.73	0.00	111.94	130.9
* 42900.000	547.00	150.25	0.00	1.65	0.00	134.74	116.9
43000.000	547.00	151.92	0.00	1.66	0.00	137.18	108.2
* 43100.000	276.00	153.18	0.00	1.27	0.00	72.21	100.0
* 43200.000	276.00	154.89	0.00	1.70	0.00	91.92	123.2
* 43300.000	276.00	157.18	0.00	2.29	0.00	87.61	126.6
* 43400.000	276.00	158.72	0.00	1.55	0.00	118.16	133.2
* 43500.000	276.00	160.48	0.00	1.75	0.00	154.60	209
* 43600.000	276.00	162.95	0.00	2.47	0.00	136.50	96.4
* 43700.000	276.00	165.21	0.00	2.26	0.00	57.42	153.4
* 43800.000	276.00	168.07	0.00	2.86	0.00	100.92	126.6
* 43900.000	276.00	169.20	0.00	1.13	0.00	97.15	124.0
* 44000.000	276.00	170.53	0.00	1.32	0.00	115.21	113.8
* 44100.000	276.00	172.35	0.00	1.83	0.00	121.00	117.7
44200.000	276.00	173.40	0.00	1.04	0.00	108.05	101.0
44300.000	276.00	174.89	0.00	1.50	0.00	113.78	102.3
44400.000	276.00	176.88	0.00	1.98	0.00	98.89	107.3
44500.000	276.00	179.17	0.00	2.29	0.00	117.20	144.2
44600.000	276.00	180.81	0.00	1.64	0.00	64.14	102.6
44700.000	276.00	181.90	0.00	1.09	0.00	111.33	116.3
44800.000	276.00	183.48	0.00	1.58	0.00	74.77	92.4

2H6V1395

228

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/200

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channe Reach Length (ft) XLCH
SECNO							
* 44900.000	276.00	186.06	0.00	2.59	0.00	152.61	105
* 45000.000	276.00	187.54	0.00	1.48	0.00	72.53	106.
45100.000	276.00	190.25	0.00	2.71	0.00	66.35	103.
45200.000	276.00	192.18	0.00	1.94	0.00	67.68	108.
45300.000	276.00	194.11	0.00	1.93	0.00	86.13	93.
* 45400.000	276.00	196.87	0.00	2.76	0.00	53.88	109.
* 45500.000	276.00	199.59	0.00	2.72	0.00	58.34	115.
45600.000	276.00	201.04	0.00	1.45	0.00	66.13	103.

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 40002, profile 1, critical depth assumed.

Section 40002, profile 1, probable minimum specific energy.

Section 40002, profile 1, 20 trials attempted to balance water surface elevation.

Section 40003, profile 1, conveyance change outside acceptable range.

Section 40004, profile 1, conveyance change outside acceptable range.

Section 40100, profile 1, conveyance change outside acceptable range.

Section 40200, profile 1, conveyance change outside acceptable range.

Section 40300, profile 1, conveyance change outside acceptable range.

Section 40900, profile 1, conveyance change outside acceptable range.

Section 41100, profile 1, conveyance change outside acceptable range.

Section 41200, profile 1, conveyance change outside acceptable range.

Section 41300, profile 1, conveyance change outside acceptable range.

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Section 41400, profile 1, critical depth assumed.
Section 41400, profile 1, minimum specific energy.
Section 41500, profile 1, critical depth assumed.
Section 41500, profile 1, probable minimum specific energy.
Section 41500, profile 1, 20 trials attempted to balance water surface elevation.
Section 41600, profile 1, critical depth assumed.
Section 41600, profile 1, minimum specific energy.
Section 41800, profile 1, conveyance change outside acceptable range.
Section 41900, profile 1, conveyance change outside acceptable range.
Section 42000, profile 1, conveyance change outside acceptable range.
Section 42100, profile 1, critical depth assumed.
Section 42100, profile 1, minimum specific energy.
Section 42200, profile 1, critical depth assumed.
Section 42200, profile 1, minimum specific energy.
Section 42300, profile 1, conveyance change outside acceptable range.
Section 42400, profile 1, conveyance change outside acceptable range.
Section 42500, profile 1, critical depth assumed.
Section 42500, profile 1, minimum specific energy.
Section 42600, profile 1, critical depth assumed.
Section 42600, profile 1, minimum specific energy.
Section 42800, profile 1, critical depth assumed.
Section 42800, profile 1, minimum specific energy.
Section 42900, profile 1, critical depth assumed.
Section 42900, profile 1, minimum specific energy.
Section 43100, profile 1, critical depth assumed.

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Section 43100, profile 1, probable minimum specific energy.
Section 43100, profile 1, 20 trials attempted to balance water surface elevation.
Section 43200, profile 1, critical depth assumed.
Section 43200, profile 1, minimum specific energy.
Section 43300, profile 1, conveyance change outside acceptable range.
Section 43400, profile 1, conveyance change outside acceptable range.
Section 43500, profile 1, critical depth assumed.
Section 43500, profile 1, minimum specific energy.
Section 43600, profile 1, conveyance change outside acceptable range.
Section 43700, profile 1, conveyance change outside acceptable range.
Section 43800, profile 1, conveyance change outside acceptable range.
Section 43900, profile 1, conveyance change outside acceptable range.
Section 44000, profile 1, conveyance change outside acceptable range.
Section 44100, profile 1, conveyance change outside acceptable range.
Section 44700, profile 1, conveyance change outside acceptable range.
Section 44800, profile 1, critical depth assumed.
Section 44800, profile 1, probable minimum specific energy.
Section 44800, profile 1, 20 trials attempted to balance water surface elevation.
Section 44800, profile 1, slope too steep.
Section 44900, profile 1, conveyance change outside acceptable range.
Section 45000, profile 1, conveyance change outside acceptable range.
Section 45400, profile 1, conveyance change outside acceptable range.
Section 45500, profile 1, conveyance change outside acceptable range.
60 Warning and status message(s) generated

BOSS RiverCAD HEC-2 Analysis version 4.0
PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01

PAGE

5/09/2000

=====
BOSS RiverCAD (tm)
=====

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Version : 4.0
Serial Number : 10120

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PROGRAM ORIGIN :

BOSS RiverCAD HEC-2 Analysis is an enhanced version of the U.S.
Army Corps of Engineers Hydrologic Engineering Center HEC-2 program
for water-surface profile computations. Program based upon the September
1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 1 POST-DEVELOPMENT
ENGINEER : TIM EVERLY
DATE OF RUN : 5/09/2000
TIME OF RUN : 10:09 am

2H6V1399

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

T1 99-33-01
T2 FOUR SEASONS IN HIST. VA. - FLOODPLAIN STUDY
T3 WATERSHED 1 POST-DEVELOPMENT
T4 FLOW REDUCTION @ CROSS SECTION 10100 TO ACCOUNT FOR FLOW CHanneled
T4 ONTO THE PROPERTY BY WAY OF A CULVERT UNDER I-95

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q
	-10	2						459
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW
	-1		-1					-6

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 10001.000.

2H6V1400

5/09/2000

Cross Section Number ECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
LOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Level Time ME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONT
001.000	0.120	0.035	0.110	8.19	106.19	0.00	106.19
.001766	0	0	0	106.37	0.18	0.00	0.00
0.00	93	27	108	0.00	99.00	99.00	0
459	144	153	161	56.1	1007.89	1063.94	0
0.00	1.55	5.55	1.49	0.000	0.0	98.00	0

STATUS: Analyzing cross-section reach 10002.000.

002.000	0.120	0.035	0.110	7.88	106.38	0.00	0.00
.001636	29	28	28	106.43	0.06	0.05	0.01
0.17	97	11	168	0.00	99.50	99.50	2
459	140	46	272	64.2	1007.11	1071.29	0
0.00	1.43	3.99	1.61	0.000	0.0	98.50	0

STATUS: Analyzing cross-section reach 10100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.53

2H6V1401

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	COPAR	LBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
10100.000	0.110	0.040	0.110	5.69	106.69	0.00	0.00
0.003311	188	102	85	106.73	0.05	0.30	0.00
1.01	182	8	43	0.00	102.00	102.00	0.00
344	241	33	69	117.3	1037.22	1154.56	0.00
0.03	1.33	3.87	1.60	0.000	0.4	101.00	0.00

STATUS: Analyzing cross-section reach 10200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.62

10200.000	0.100	0.046	0.100	4.44	106.94	0.00	0.00
0.008491	42	98	86	107.04	0.09	0.29	0.00
1.25	105	6	41	0.00	103.50	103.50	0.00
344	221	30	92	95.7	1046.62	1142.34	0.00
0.04	2.10	4.57	2.21	0.000	0.5	102.50	0.00

STATUS: Analyzing cross-section reach 10300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.6

10300.000	0.110	0.052	0.120	3.67	108.17	0.00	0.00
0.020084	104	102	95	108.30	0.13	1.25	0.00
1.57	37	5	88	0.00	105.50	105.50	0.00
344	104	30	209	92.6	1031.37	1124.01	0.00
0.05	2.79	5.48	2.36	0.000	0.7	104.50	0.00

STATUS: Analyzing cross-section reach 10400.000.

10400.000	0.110	0.052	0.120	4.87	109.77	0.00	0.00
0.021210	69	102	92	110.06	0.29	1.71	0.00
1.80	75	9	18	0.00	105.90	105.90	0.00
344	223	73	47	76.2	1026.01	1102.17	0.00
0.05	2.94	7.53	2.49	0.000	0.9	104.90	0.00

STATUS: Analyzing cross-section reach 10500.000.

2H6V1402

2:

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLOCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

0500.000	0.120	0.046	0.110	3.51	110.80	0.00	0.00
0.010995	41	97	66	111.04	0.24	0.97	0.01
1.96	9	14	107	0.00	107.95	107.95	2
344	16	97	230	72.8	1028.57	1101.40	0
0.06	1.77	6.52	2.14	0.000	1.0	107.29	0

STATUS: Analyzing cross-section reach 10600.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

0600.000	0.120	0.046	0.110	3.60	112.04	112.04	0.00
0.030066	66	101	56	112.98	0.94	1.30	0.21
2.11	49	14	4	0.00	109.10	109.10	20
344	174	156	13	34.2	1082.77	1117.02	5
0.06	3.54	10.87	2.67	0.000	1.0	108.44	0

STATUS: Analyzing cross-section reach 10700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.44

00.000	0.120	0.046	0.110	3.80	114.80	0.00	0.00
014586	102	105	75	114.95	0.15	1.89	0.08
2.31	40	1	72	0.00	111.50	111.50	2
344	95	8	239	55.9	1063.30	1119.22	0
0.07	2.35	4.56	3.30	0.000	1.1	111.00	0

STATUS: Analyzing cross-section reach 10800.000.

2H6V1403

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

10800.000	0.120	0.046	0.110	3.70	116.20	0.00	0.0
0.017726	64	93	90	116.31	0.11	1.36	0.0
2.54	22	1	107	0.00	113.00	113.00	
344	60	9	274	91.6	1058.84	1150.49	
0.08	2.67	4.94	2.55	0.000	1.3	112.50	

STATUS: Analyzing cross-section reach 10900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.66

10900.000	0.120	0.046	0.110	3.51	116.91	0.00	0.00
0.006459	114	90	29	116.95	0.05	0.64	0.01
2.81	130	1	73	0.00	113.90	113.90	
344	202	5	136	108.6	1017.73	1126.33	
0.09	1.55	2.88	1.86	0.000	1.4	113.40	

STATUS: Analyzing cross-section reach 11000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.26

11000.000	0.120	0.046	0.110	3.09	117.59	0.00	0.00
0.095392	35	94	101	118.03	0.44	0.96	0.12
2.99	50	1	16	0.00	115.00	115.00	
344	238	15	90	63.3	1030.85	1094.12	
0.09	4.67	10.18	5.58	0.000	1.5	114.50	

STATUS: Analyzing cross-section reach 11100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.42

11100.000	0.120	0.046	0.110	3.92	120.02	0.00	0.00
0.016318	46	97	90	120.17	0.15	2.12	0.03
3.13	59	1	50	0.00	116.60	116.60	
344	168	9	166	51.0	1013.82	1064.80	
0.10	2.83	4.94	3.27	0.000	1.6	116.10	

STATUS: Analyzing cross-section reach 11200.000.

2H6V1404

5/09/2000

CNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
OFF	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
L	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
ME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
200.000	0.120	0.046	0.110	3.76	121.61	0.00	0.00
.031198	98	98	63	121.83	0.22	1.64	0.02
3.31	9	1	83	0.00	118.35	118.35	4
344	29	12	302	62.0	1007.94	1069.94	0
0.10	3.16	6.64	3.62	0.000	1.7	117.85	0

STATUS: Analyzing cross-section reach 11300.000.

300.000	0.120	0.046	0.110	3.14	122.89	0.00	0.00
.022195	95	100	34	123.06	0.17	1.23	0.00
3.42	29	3	84	0.00	120.25	120.25	3
344	77	22	244	70.9	1009.82	1080.69	0
0.11	2.66	7.30	2.88	0.000	1.8	119.75	0

STATUS: Analyzing cross-section reach 11400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.56

400.000	0.120	0.046	0.110	2.69	124.29	0.00	0.00
.070706	66	64	35	124.67	0.38	1.54	0.06
3.51	6	2	70	0.00	122.10	122.10	1
344	24	28	290	67.3	1023.69	1090.99	0
0.11	3.61	10.48	4.13	0.000	1.8	121.60	0

STATUS: Analyzing cross-section reach 11500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 3.27

500.000	0.120	0.046	0.110	3.45	126.45	0.00	0.00
.006602	21	170	160	126.49	0.04	1.79	0.03
3.86	154	3	90	0.00	123.50	123.50	7
344	201	14	128	168.9	1042.44	1211.31	0
0.13	1.30	4.25	1.43	0.000	2.1	123.00	0

STATUS: Analyzing cross-section reach 11600.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

2H6V1405

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
11600.000	0.120	0.046	0.110	3.32	127.82	127.82	0.00
0.070917	36	69	91	128.51	0.69	0.97	0.20
4.07	28	3	32	0.00	125.00	125.00	20
344	134	43	166	43.0	1126.90	1169.92	8
0.13	4.76	13.55	5.10	0.000	2.2	124.50	0

STATUS: Analyzing cross-section reach 11700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.40

11700.000	0.120	0.046	0.110	3.61	130.11	0.00	0.00
0.012311	38	106	87	130.21	0.10	1.63	0.05
4.23	109	3	56	0.00	127.00	127.00	6
344	182	20	140	119.8	1041.78	1161.54	0
0.14	1.66	5.98	2.47	0.000	2.3	126.50	0

STATUS: Analyzing cross-section reach 11800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.44

11800.000	0.120	0.046	0.110	2.94	131.94	0.00	0.00
0.064902	81	101	86	132.31	0.37	2.02	0.08
4.49	77	2	16	0.00	129.50	129.50	4
344	248	33	62	92.7	1030.77	1123.43	0
0.15	3.21	11.90	3.88	0.000	2.5	129.00	0

STATUS: Analyzing cross-section reach 11900.000.

5/09/2000

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

2.25

ECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
LOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
DL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
ME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
1900.000	0.120	0.046	0.110	3.68	134.18	0.00	0.00
0.012812	75	89	86	134.26	0.09	1.93	0.03
4.72	145	3	22	0.00	131.00	131.00	4
344	270	18	54	118.4	1014.05	1132.43	0
0.16	1.86	5.87	2.40	0.000	2.7	130.50	0

STATUS: Analyzing cross-section reach 12000.000.

2000.000	0.100	0.040	0.100	5.18	136.71	0.00	0.00
0.017386	236	108	80	137.02	0.31	2.69	0.07
5.33	53	5	38	0.00	132.20	132.20	3
344	162	45	136	66.8	1077.30	1144.14	0
0.17	3.06	8.96	3.49	0.000	3.2	131.53	0

STATUS: Analyzing cross-section reach 12100.000.

100.000	0.100	0.040	0.100	4.45	137.78	0.00	0.00
0.018178	34	85	72	138.00	0.22	0.97	0.01
5.45	68	4	42	0.00	134.00	134.00	2
344	182	35	125	87.8	1101.28	1189.08	0
0.17	2.68	8.26	2.91	0.000	3.3	133.33	0

STATUS: Analyzing cross-section reach 12200.000.

200.000	0.100	0.040	0.100	3.02	139.35	0.00	0.00
0.034681	35	101	80	139.66	0.30	1.63	0.03
5.60	16	2	66	0.00	137.00	137.00	2
344	51	25	266	59.0	1109.29	1168.31	0
0.18	3.12	8.74	4.00	0.000	3.4	136.33	0

STATUS: Analyzing cross-section reach 12300.000.

300.000	0.120	0.063	0.120	3.84	141.97	0.00	0.00
0.031681	77	99	71	142.16	0.19	2.49	0.01
5.76	53	2	49	0.00	138.80	138.80	3
344	139	12	191	70.6	1134.28	1204.90	0
0.18	2.61	4.95	3.87	0.000	3.5	138.13	0

STATUS: Analyzing cross-section reach 12400.000.

2H6V1407

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2001

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

1.82

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
12400.000	0.120	0.063	0.120	3.24	143.54	0.00	0.00
0.009572	95	92	86	143.62	0.08	1.45	0.01
6.05	93	6	71	0.00	140.50	140.50	4
344	167	31	145	101.7	1031.35	1133.02	0
0.20	1.79	4.86	2.02	0.000	3.6	140.30	0

STATUS: Analyzing cross-section reach 12500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

0.45

12500.000	0.120	0.063	0.120	2.09	144.39	0.00	0.00
0.046989	46	103	48	144.62	0.23	0.95	0.04
6.21	53	4	45	0.00	142.50	142.50	2
344	178	32	133	85.8	1020.64	1106.48	0
0.20	3.31	7.99	2.91	0.000	3.8	142.30	0

STATUS: Analyzing cross-section reach 12600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

1.53

12600.000	0.120	0.063	0.120	2.45	147.25	0.00	0.00
0.019980	97	96	88	147.38	0.13	2.75	0.01
6.46	62	4	65	0.00	145.00	145.00	3
344	155	27	160	82.1	1022.38	1104.50	0
0.21	2.48	5.80	2.46	0.000	3.9	144.80	0

2H6V1408

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
WATERSHED 1 POST-DEVELOPMENT
99-33-01

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRISW
10001.000	0.00	0.00	0.00	98.00	459.00	106.19	0.0
10002.000	28.38	0.00	0.00	98.50	459.00	106.38	0.0
10100.000	102.83	0.00	0.00	101.00	344.00	106.69	0.0
10200.000	98.18	0.00	0.00	102.50	344.00	106.94	0.0
10300.000	102.11	0.00	0.00	104.50	344.00	108.17	0.0
10400.000	102.49	0.00	0.00	104.90	344.00	109.77	0.0
10500.000	97.67	0.00	0.00	107.29	344.00	110.80	0.0
10600.000	101.47	0.00	0.00	108.44	344.00	112.04	112.0
10700.000	105.21	0.00	0.00	111.00	344.00	114.80	0.0
10800.000	93.36	0.00	0.00	112.50	344.00	116.20	0.0
10900.000	90.86	0.00	0.00	113.40	344.00	116.91	0.0
11000.000	94.58	0.00	0.00	114.50	344.00	117.59	0.0
11100.000	97.28	0.00	0.00	116.10	344.00	120.02	0.0
11200.000	98.85	0.00	0.00	117.85	344.00	121.61	0.0
11300.000	100.80	0.00	0.00	119.75	344.00	122.89	0.0
11400.000	64.52	0.00	0.00	121.60	344.00	124.29	0.0

2H6V1409

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS
* 11500.000	170.47	0.00	0.00	123.00	344.00	126.45	0.
* 11600.000	69.17	0.00	0.00	124.50	344.00	127.82	127.
* 11700.000	106.65	0.00	0.00	126.50	344.00	130.11	0.
* 11800.000	101.83	0.00	0.00	129.00	344.00	131.94	0.
* 11900.000	89.17	0.00	0.00	130.50	344.00	134.18	0.
12000.000	108.38	0.00	0.00	131.53	344.00	136.71	0.
12100.000	85.55	0.00	0.00	133.33	344.00	137.78	0.
12200.000	101.66	0.00	0.00	136.33	344.00	139.35	0.
12300.000	99.25	0.00	0.00	138.13	344.00	141.97	0.
12400.000	92.15	0.00	0.00	140.30	344.00	143.54	0.
* 12500.000	103.58	0.00	0.00	142.30	344.00	144.39	0.
* 12600.000	96.79	0.00	0.00	144.80	344.00	147.25	0.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
 ----- WATERSHED 1 POST-DEVELOPMENT
 99-33-01

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
10001.000	459.00	106.19	0.00	0.00	0.00	56.06	0.0
10002.000	459.00	106.38	0.00	0.19	0.00	64.18	28.3
* 10100.000	344.00	106.69	0.00	0.31	0.00	117.34	102.8

2H6V1410

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
10200.000	344.00	106.94	0.00	0.26	0.00	95.72	98.1
10300.000	344.00	108.17	0.00	1.22	0.00	92.64	102.1
10400.000	344.00	109.77	0.00	1.60	0.00	76.16	102.4
10500.000	344.00	110.80	0.00	1.03	0.00	72.83	97.6
10600.000	344.00	112.04	0.00	1.24	0.00	34.25	101.4
10700.000	344.00	114.80	0.00	2.76	0.00	55.92	105.2
10800.000	344.00	116.20	0.00	1.40	0.00	91.65	93.3
10900.000	344.00	116.91	0.00	0.71	0.00	108.59	90.8
11000.000	344.00	117.59	0.00	0.69	0.00	63.26	94.5
11100.000	344.00	120.02	0.00	2.43	0.00	50.98	97.2
11200.000	344.00	121.61	0.00	1.59	0.00	62.01	98.8
11300.000	344.00	122.89	0.00	1.28	0.00	70.88	100.8
11400.000	344.00	124.29	0.00	1.40	0.00	67.29	64.5
11500.000	344.00	126.45	0.00	2.16	0.00	168.86	170.4
11600.000	344.00	127.82	0.00	1.37	0.00	43.02	69.1
11700.000	344.00	130.11	0.00	2.29	0.00	119.76	106.6
11800.000	344.00	131.94	0.00	1.83	0.00	92.66	101.8
11900.000	344.00	134.18	0.00	2.24	0.00	118.38	89.1
12000.000	344.00	136.71	0.00	2.53	0.00	66.85	108.3
12100.000	344.00	137.78	0.00	1.07	0.00	87.81	85.5
12200.000	344.00	139.35	0.00	1.57	0.00	59.03	101.6
12300.000	344.00	141.97	0.00	2.62	0.00	70.63	99.2

2H6V1411

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
* 12400.000	344.00	143.54	0.00	1.57	0.00	101.67	92.1
* 12500.000	344.00	144.39	0.00	0.85	0.00	85.84	103.5
* 12600.000	344.00	147.25	0.00	2.86	0.00	82.12	96.7

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 10100, profile 1, conveyance change outside acceptable range.

Section 10200, profile 1, conveyance change outside acceptable range.

Section 10300, profile 1, conveyance change outside acceptable range.

Section 10600, profile 1, critical depth assumed.

Section 10600, profile 1, probable minimum specific energy.

Section 10600, profile 1, 20 trials attempted to balance water surface elevation.

Section 10700, profile 1, conveyance change outside acceptable range.

Section 10900, profile 1, conveyance change outside acceptable range.

Section 11000, profile 1, conveyance change outside acceptable range.

Section 11100, profile 1, conveyance change outside acceptable range.

Section 11400, profile 1, conveyance change outside acceptable range.

Section 11500, profile 1, conveyance change outside acceptable range.

Section 11600, profile 1, critical depth assumed.

Section 11600, profile 1, probable minimum specific energy.

Section 11600, profile 1, 20 trials attempted to balance water surface elevation.

Section 11700, profile 1, conveyance change outside acceptable range.

Section 11800, profile 1, conveyance change outside acceptable range.

2H6V1412

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Section 11900, profile 1, conveyance change outside acceptable range.

Section 12400, profile 1, conveyance change outside acceptable range.

Section 12500, profile 1, conveyance change outside acceptable range.

Section 12600, profile 1, conveyance change outside acceptable range.

21 Warning and status message(s) generated

END OF OUTPUT

2H6V1413

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=====

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PROGRAM ORIGIN :

BOSS RiverCAD HEC-2 Analysis is an enhanced version of the U.S.
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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 2 POST-DEVELOPMENT
ENGINEER : TIM EVERLY
DATE OF RUN : 5/08/2000
TIME OF RUN : 10:09 pm

2H6V1414

BOSS RiverCAD HEC-2 Analysis version 4.0
PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01

PAGE 2

5/08/2000

T1 99-33-01
T2 FOUR SEASONS IN HIST. VA. - FLOODPLAIN STUDY
T3 WATERSHED 2 POST-DEVELOPMENT
T4 STARTING ELEVATION AT DOWNSTREAM CROSS SECTION 20100 OBTAINED FROM
T4 POWELLS CREEK WATERSHED STUDY

SUB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q
	-10	2						232.17
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW
	-1		-1					-6

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 20100.000.

2H6V1415

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONTR
20100.000	0.120	0.039	0.110	5.50	87.00	0.00	87.00
0.002022	0	0	0	87.10	0.10	0.00	0.00
0.00	74	13	83	0.00	82.00	82.00	0
232	76	61	94	77.2	1044.17	1121.33	0
0.00	1.03	4.47	1.14	0.000	0.0	81.50	0

STATUS: Analyzing cross-section reach 20200.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

2H6V1416

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	FL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
20200.000	0.120	0.039	0.110	4.14	88.34	88.34	0.00
0.021624	109	112	66	89.16	0.82	0.45	0.22
0.23	21	8	26	0.00	84.70	84.70	20
232	61	91	79	33.1	1095.71	1128.79	19
0.00	2.82	11.02	3.06	0.000	0.1	84.20	0

STATUS: Analyzing cross-section reach 20300.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

20300.000	0.130	0.035	0.110	3.38	91.38	91.38	0.00
0.024972	63	134	126	92.16	0.78	2.57	0.00
0.37	27	6	24	0.00	88.50	88.50	3
232	73	77	80	36.4	1082.11	1118.51	15
0.01	2.64	11.53	3.22	0.000	0.2	88.00	0

STATUS: Analyzing cross-section reach 20400.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

20400.000	0.130	0.035	0.110	4.13	95.63	95.63	0.00
0.016206	136	173	100	96.33	0.70	2.70	0.01
0.55	17	8	50	0.00	92.00	92.00	1
232	42	87	102	60.0	1021.47	1081.45	11
0.02	2.46	10.61	2.00	0.000	0.3	91.50	0

STATUS: Analyzing cross-section reach 20500.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

2H6V1417

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

SECTNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOFWD	SSIA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
20500.000	0.130	0.035	0.110	4.04	99.04	99.04	0.00
0.021535	134	151	84	100.09	1.04	2.27	0.10
0.71	18	8	23	0.00	95.50	95.50	20
232	57	97	77	23.4	1025.40	1048.75	8
0.02	3.07	12.07	3.32	0.000	0.4	95.00	0

STATUS: Analyzing cross-section reach 20600.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

20600.000	0.130	0.035	0.110	4.65	102.15	102.15	0.00
0.015378	107	107	87	103.25	1.11	1.84	0.02
0.83	27	8	19	0.00	98.00	98.00	20
232	72	103	56	23.5	1042.81	1066.36	8
0.03	2.63	12.26	2.94	0.000	0.5	97.50	0

STATUS: Analyzing cross-section reach 20700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.48

20700.000	0.130	0.035	0.110	4.08	104.08	0.00	0.00
0.007062	89	99	101	104.30	0.22	0.95	0.09
1.00	92	8	8	0.00	100.50	100.50	2
232	162	56	13	49.6	1058.97	1108.60	0
0.03	1.75	6.95	1.63	0.000	0.5	100.00	0

STATUS: Analyzing cross-section reach 20800.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

2H6V1418

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
20800.000	0.130	0.035	0.110	4.00	107.50	107.50	0.00
0.027184	106	183	123	108.27	0.77	1.59	0.17
1.23	48	5	7	0.00	104.00	104.00	20
232	141	67	23	37.5	1051.71	1089.20	8
0.04	2.92	12.25	3.16	0.000	0.7	103.50	0

STATUS: Analyzing cross-section reach 20900.000.

20900.000	0.130	0.035	0.110	4.47	110.07	0.00	0.00
0.022268	95	112	101	110.76	0.69	2.48	0.01
1.36	42	4	12	0.00	106.00	106.00	2
232	133	59	38	27.9	1046.61	1074.49	0
0.05	3.18	11.98	3.04	0.000	0.7	105.60	0

STATUS: Analyzing cross-section reach 21000.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

1000.000	0.130	0.035	0.110	3.83	112.33	112.33	0.00
0.022039	104	114	83	113.26	0.93	2.28	0.07
1.50	25	7	20	0.00	109.00	109.00	2
232	70	90	71	28.6	1074.47	1103.08	15
0.05	2.73	11.77	3.41	0.000	0.8	108.50	0

STATUS: Analyzing cross-section reach 21100.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.10

2H6V1419

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTENK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
21100.000	0.110	0.035	0.110	4.29	114.79	0.00	0.00
0.004980	187	196	150	114.95	0.17	1.62	0.08
1.81	45	8	50	0.00	111.00	111.00	3
232	86	51	93	43.6	1075.00	1118.60	0
0.07	1.89	6.04	1.84	0.000	0.9	110.50	0

STATUS: Analyzing cross-section reach 21200.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

21200.000	0.110	0.035	0.110	3.85	116.85	116.85	0.00
0.034612	66	73	62	117.48	0.63	0.70	0.14
1.93	39	3	11	0.00	113.50	113.50	20
232	137	47	47	44.8	1060.81	1105.57	15
0.07	3.44	12.22	4.07	0.000	1.0	113.00	0

STATUS: Analyzing cross-section reach 21300.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

21300.000	0.110	0.035	0.110	4.06	119.66	119.66	0.00
0.038096	85	70	68	120.49	0.83	2.81	0.06
2.02	22	4	21	0.00	116.10	116.10	2
232	88	53	90	28.6	1091.27	1119.85	8
0.07	3.88	13.28	4.28	0.000	1.1	115.60	0

STATUS: Analyzing cross-section reach 21400.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

2H6V1420

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LITBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

21400.000	0.110	0.035	0.110	4.68	122.18	122.18	0.00
0.013791	97	102	99	123.28	1.10	2.15	0.08
2.14	24	8	20	0.00	118.00	118.00	3
232	71	107	52	24.9	1061.70	1086.57	11
0.08	2.94	12.00	2.60	0.000	1.1	117.50	0

STATUS: Analyzing cross-section reach 21500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

21500.000	0.110	0.035	0.110	5.21	124.21	0.00	0.00
0.009938	81	98	106	124.47	0.27	1.11	0.08
2.28	28	5	43	0.00	119.50	119.50	3
232	79	41	110	34.9	1050.93	1085.82	0
0.09	2.78	8.01	2.54	0.000	1.2	119.00	0

STATUS: Analyzing cross-section reach 21600.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

21600.000	0.110	0.035	0.110	3.78	126.28	126.28	0.00
0.041277	96	100	106	127.09	0.81	1.81	0.16
2.43	23	3	18	0.00	123.00	123.00	20
232	99	49	83	25.8	1081.56	1107.32	19
0.09	4.29	13.18	4.52	0.000	1.3	122.50	0

STATUS: Analyzing cross-section reach 21700.000.

21700.000	0.110	0.035	0.110	3.69	130.19	0.00	0.00
0.023863	118	103	106	130.56	0.37	3.43	0.04
2.57	38	3	23	0.00	127.00	127.00	3
232	115	36	79	42.5	1089.87	1132.40	0
0.10	2.98	9.89	3.40	0.000	1.3	126.50	0

STATUS: Analyzing cross-section reach 21800.000.

2H6V1421

5/09/2000

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
21800.000	0.110	0.035	0.110	3.52	134.02	134.02	0.00
0.037656	106	101	108	134.59	0.57	3.14	0.06
2.72	23	3	30	0.00	131.00	131.00	2
232	84	42	105	41.4	1153.96	1195.36	11
0.10	3.57	12.01	3.50	0.000	1.5	130.50	0

STATUS: Analyzing cross-section reach 21900.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

900.000	0.110	0.035	0.110	4.06	137.56	137.56	0.00
.023148	115	100	100	138.33	0.77	3.07	0.06
2.87	19	5	35	0.00	134.00	134.00	3
232	64	63	103	38.4	1200.31	1238.69	11
0.11	3.33	12.44	2.96	0.000	1.6	133.50	0

STATUS: Analyzing cross-section reach 22000.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

22000.000	0.110	0.035	0.110	4.22	140.72	140.72	0.00
0.034808	106	103	105	141.54	0.82	2.95	0.02
3.00	14	4	28	0.00	137.00	137.00	3
232	58	54	118	28.2	1086.51	1114.68	8
0.11	3.96	13.03	4.13	0.000	1.6	136.50	0

STATUS: Analyzing cross-section reach 22100.000.

2H6V1422

5/08/2007

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLCEL	XLCH	XLOBR	EG	HV	HL	CLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	YTRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
22100.000	0.110	0.035	0.110	4.94	143.44	0.00	0.00
0.018663	97	94	94	143.95	0.51	2.38	0.03
3.12	21	4	37	0.00	139.00	139.00	1
232	80	52	98	39.8	1070.19	1109.95	0
0.12	3.68	10.60	2.64	0.000	1.7	138.50	0

STATUS: Analyzing cross-section reach 22200.000.

22200.000	0.110	0.035	0.110	3.83	145.33	0.00	0.00
0.015012	92	103	102	145.62	0.29	1.65	0.02
3.27	30	3	34	0.00	141.90	141.90	3
232	93	32	105	32.4	1149.71	1182.08	0
0.13	3.09	8.61	3.04	0.000	1.8	141.50	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S WATERSHED 2 POST-DEVELOPMENT 99-33-01

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRWS
20100.000	0.00	0.00	0.00	81.50	232.17	87.00	0.0
20200.000	112.32	0.00	0.00	84.20	232.17	88.34	88.3
20300.000	134.25	0.00	0.00	88.00	232.17	91.38	91.3
20400.000	173.21	0.00	0.00	91.50	232.17	95.63	95.6
20500.000	151.83	0.00	0.00	95.00	232.17	99.04	99.0

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PROJECT TITLE FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS
* 20600.000	107.47	0.00	0.00	97.50	232.17	102.15	102.15
* 20700.000	99.93	0.00	0.00	100.00	232.17	104.08	0.00
* 20800.000	183.11	0.00	0.00	103.50	232.17	107.50	107.50
20900.000	112.69	0.00	0.00	105.60	232.17	110.07	0.00
* 21000.000	114.27	0.00	0.00	108.50	232.17	112.33	112.33
* 21100.000	196.81	0.00	0.00	110.50	232.17	114.79	0.00
* 21200.000	73.90	0.00	0.00	113.00	232.17	116.85	116.85
* 21300.000	70.98	0.00	0.00	115.60	232.17	119.66	119.66
* 21400.000	102.70	0.00	0.00	117.50	232.17	122.18	122.18
21500.000	98.75	0.00	0.00	119.00	232.17	124.21	0.00
21600.000	100.64	0.00	0.00	122.50	232.17	126.28	126.28
21700.000	103.39	0.00	0.00	126.50	232.17	130.19	0.00
* 21800.000	101.62	0.00	0.00	130.50	232.17	134.02	134.02
* 21900.000	100.98	0.00	0.00	133.50	232.17	137.56	137.56
22000.000	103.28	0.00	0.00	136.50	232.17	140.72	140.72
22100.000	94.62	0.00	0.00	138.50	232.17	143.44	0.00
22200.000	103.10	0.00	0.00	141.50	232.17	145.33	0.00

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

----- WATERSHED 2 POST-DEVELOPMENT

99-33-01

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
20100.000	232.17	87.00	0.00	0.00	0.00	77.17	0.0
20200.000	232.17	88.34	0.00	1.34	0.00	33.08	112.3
20300.000	232.17	91.38	0.00	3.04	0.00	36.39	134.2
20400.000	232.17	95.63	0.00	4.25	0.00	59.98	173.2
20500.000	232.17	99.04	0.00	3.42	0.00	23.35	151.8
20600.000	232.17	102.15	0.00	3.10	0.00	23.54	107.4
20700.000	232.17	104.08	0.00	1.93	0.00	49.63	99.
20800.000	232.17	107.50	0.00	3.42	0.00	37.49	183.1
20900.000	232.17	110.07	0.00	2.57	0.00	27.88	112.6
21000.000	232.17	112.33	0.00	2.26	0.00	28.61	114.2
21100.000	232.17	114.79	0.00	2.46	0.00	43.60	196.8
21200.000	232.17	116.85	0.00	2.06	0.00	44.76	73.9
21300.000	232.17	119.66	0.00	2.81	0.00	28.58	70.9
21400.000	232.17	122.18	0.00	2.52	0.00	24.87	102.7
21500.000	232.17	124.21	0.00	2.03	0.00	34.89	98.7
21600.000	232.17	126.28	0.00	2.07	0.00	25.76	100.6
21700.000	232.17	130.19	0.00	3.92	0.00	42.52	103.3
21800.000	232.17	134.02	0.00	3.83	0.00	41.40	101.6
21900.000	232.17	137.56	0.00	3.54	0.00	38.38	100.9

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PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/08/2000

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach' Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
* 22000.000	232.17	140.72	0.00	3.16	0.00	28.16	103.2
22100.000	232.17	143.44	0.00	2.72	0.00	39.77	94.6
22200.000	232.17	145.33	0.00	1.89	0.00	32.37	103.1

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 20200, profile 1, critical depth assumed.

Section 20200, profile 1, probable minimum specific energy.

Section 20200, profile 1, 20 trials attempted to balance water surface elevation.

Section 20300, profile 1, critical depth assumed.

Section 20300, profile 1, minimum specific energy.

Section 20400, profile 1, critical depth assumed.

Section 20400, profile 1, minimum specific energy.

Section 20500, profile 1, critical depth assumed.

Section 20500, profile 1, probable minimum specific energy.

Section 20500, profile 1, 20 trials attempted to balance water surface elevation.

Section 20600, profile 1, critical depth assumed.

Section 20600, profile 1, probable minimum specific energy.

Section 20600, profile 1, 20 trials attempted to balance water surface elevation.

Section 20700, profile 1, conveyance change outside acceptable range.

Section 20800, profile 1, critical depth assumed.

Section 20800, profile 1, probable minimum specific energy.

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Section 20800, profile 1, 20 trials attempted to balance water surface elevation.

Section 21000, profile 1, critical depth assumed.

Section 21000, profile 1, minimum specific energy.

Section 21100, profile 1, conveyance change outside acceptable range.

Section 21200, profile 1, critical depth assumed.

Section 21200, profile 1, probable minimum specific energy.

Section 21200, profile 1, 20 trials attempted to balance water surface elevation.

Section 21300, profile 1, critical depth assumed.

Section 21300, profile 1, minimum specific energy.

Section 21400, profile 1, critical depth assumed.

Section 21400, profile 1, minimum specific energy.

Section 21600, profile 1, critical depth assumed.

Section 21600, profile 1, probable minimum specific energy.

Section 21600, profile 1, 20 trials attempted to balance water surface elevation.

Section 21800, profile 1, critical depth assumed.

Section 21800, profile 1, minimum specific energy.

Section 21900, profile 1, critical depth assumed.

Section 21900, profile 1, minimum specific energy.

Section 22000, profile 1, critical depth assumed.

Section 22000, profile 1, minimum specific energy.

36 Warning and status message(s) generated

END OF OUTPUT

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PROJECT TITLE : FOUR SEASONS

PROJECT NUMBER : 99-33-01

9/30/2002

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Version : 2000

PROGRAM ORIGIN :

BOSS RMS for AutoCAD HEC-2 Analysis uses the standard 4.6.2 version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 Program for water-surface profile computations. This HEC-2 program was released on September 1990, last updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 3 POST-DEVELOPMENT *W/O POND*
ENGINEER : ROBERT BUTLER
DATE OF RUN : 9/30/2002
TIME OF RUN : 7:31 am

T1 99-33-01
T2 FOUR SEASONS
T3 WATERSHED 3 POST-DEVELOPMENT
T4 STARTING ELEVATION AT DOWNSTREAM CROSS SECTION 30001 OBTAINED FROM
T4 POWELLS CREEK WATERSHED STUDY

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2						898.17	71.5	
J2	NPROF	IPLT	PREVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1		-1					-6		
NC	0.11	0.11	0.105	0.1	0.3					
X1	30001	14	1096.27	1766.59						
GR	80	1000	78	1020.49	76	1040.98	74	1061.67	72	
1096.27										
GR	70	1137.1	72	1350.49	72	1427.39	70	1713.25	72	
1766.59										
GR	74	1802.14	76	1831.84	78	1844.68	80	1855.33		
X1	30002	10	1045.18	1473.9	172.88	110.26	129.11			
GR	82	1000	80	1014.64	78	1029.74	76	1045.18	74	
1069.61										

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GR	74	1425.9	76	1473.9	78	1490.18	80	1504.17	82
1518.16									
NC	0.11	0.11	0.105	0.1	0.3				
X1	30100	14	1050.08	1212.37	167.6	194.85	145.41		
GR	86	1000	86	1009.33	84	1018.71	52	1028.33	60
1038.35									
GR	78	1050.08	77	1065	77	1170	78	1212.37	80
1256.62									
GR	82	1311.7	84	1351.39	86	1383.92	88	1417.48	
X1	30200	20	1044.95	1174.08	89.33	106.59	101.38		
GR	94	1000	92	1066.87	90	1013.71	88	1020.54	86
1027.1									
GR	84	1033.61	82	1039.7	80	1044.95	78	1097.44	76
1136.91									
GR	78	1164.85	73	1168.04	60	1174.08	82	1180.25	84
1188.77									
GR	86	1205.18	88	1222.74	90	1237.84	92	1252.5	94
1268.67									
X1	30300	23	1060.39	1174.08	86.77	101	101.26		
GR	98	1000	96	1008.43	94	1017.04	92	1026	90
1034.95									
GR	88	1043.86	86	1051.89	84	1056.07	82	1060.39	80
1105.96									
GR	80	1131.41	80	1158.57	79	1163	80	1168.1	82
1174.08									
GR	84	1180.16	86	1186.03	88	1192.17	90	1198.14	92
1204.19									
GR	94	1211.61	96	1218.44	98	1224.64			
X1	30400	20	1057.76	1173.26	90.12	103.46	100		
GR	100	1000	98	1006.38	96	1016.58	94	1024.92	92
1033.38									
GR	90	1042.01	88	1049.58	86	1053.5	84	1057.76	82
1153.5									
GR	80.5	1165	82	1169.01	84	1173.26	86	1183.39	88
1201.02									
GR	90	1214.37	92	1225.39	94	1237.63	96	1254.46	98
1270									
NC	0.11	0.11	0.04						
X1	30500	22	1150.19	1169.08	99.46	107.83	114.82		
GR	102	1000	100	1008.72	98	1017.34	96	1025.96	94
1034.41									
GR	92	1041.47	90	1045.6	88	1049.66	86	1079.26	84
1150.19									
GR	82	1159.8	82	1164.1	84	1169.08	86	1174.85	88
1181.55									
GR	90	1186.44	92	1191.46	94	1194.98	96	1203.08	98
1211.63									
GR	100	1219.74	102	1227.79					
NC			0.1	0.3					
X1	30550	19	1159.92	1194.7	54.83	54.83	54.83		
X3	0							86	86
GR	100	1019.01	98	1027.82	96	1049.03	94	1065.77	92
1078.92									
GR	90	1092.43	88	1107.5	86	1159.92	84	1178.94	82.2
1183.49									
GR	84	1188.49	86	1194.7	88	1200.7	90	1208.15	92
1216.56									
GR	94	1224.74	96	1232.92	98	1241.49	100	1250.06	
X1	30600	24	1166.64	1173.6	114.89	103.91	102.26		
GR	104	1000	102	1010.12	100	1022.14	98	1035.12	96
1048.07									
GR	94	1055.4	92	1060.23	90	1072.76	88	1107.92	86
1159.21									
GR	84	1166.64	92	1167	82	1173.3	84	1173.6	86
1176.98									
GR	88	1180.31	90	1186	92	1193.16	94	1200.16	96
1206.89									
GR	98	1213.94	100	1221.13	102	1228.87	104	1236.37	

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X1	30700	24	1241.66	1243.65	112.03	91.84	93.75		
GR	104	1000	102	1030.61	100	1041.24	98	1064.18	56
1096.8									
GR	94	1108.6	92	1140.11	90	1184.61	88	1228.96	86
1235.48									
GR	84	1241.66	83	1242	83	1243.5	84	1243.85	86
1248.77									
GR	88	1253.63	90	1258.55	92	1263.44	94	1268.34	96
1273.23									
GR	98	1278.13	100	1283.14	102	1288.26	104	1293.38	
X1	30800	29	1172.19	1184.8	128.94	92.72	101.14		
GR	112	1000	110	1005.69	108	1011.38	106	1017.19	104
1024.82									
GR	102	1033.05	100	1042.45	98	1052.33	96	1059.77	96
1067.11									
GR	96	1072.76	94	1093.96	92	1116.42	90	1157.2	88
1172.19									
GP	85.5	1175	85.5	1175	85.5	1183	88	1184.8	90
1192.02									
GR	92	1198.69	94	1204.46	96	1210.17	100	1221.61	102
1228.54									
GR	104	1237.04	106	1245.51	110	1261.93	112	1268.91	
X1	30900	32	1182.38	1184.25	103.95	106.48	101.35		
GR	116	1000	114	1005.82	112	1011.72	110	1017.53	108
1023.35									
GR	106	1028.89	104	1032.82	102	1051.2	100	1062.24	98
1073.09									
GR	96	1089.61	94	1112.76	92	1135.86	90	1176.72	88
1182.38									
GR	86	1182.9	86	1183.8	88	1184.25	90	1188.56	92
1192.95									
GR	94	1197.23	96	1200.86	98	1204.3	100	1214.4	102
1224.08									
GR	104	1233.73	106	1242.33	108	1253.15	110	1264.97	112
1277.36									
GR	114	1294.09	116	1305.65					
NC				0.1	0.3				
X1	30950	24	1162.08	1182.83	50	50	50		
X2									
15									
X3	0							92	92
GR	110	1000	108	1017.1	106	1025.82	104	1034.21	102
1042.93									
GR	100	1051.7	98	1069.77	96	1089.78	94	1111.09	92
1162.08									
GR	90	1166.93	88	1171.78	88	1174.06	90	1178.27	92
1182.83									
GR	94	1187.04	96	1191.6	98	1194.52	100	1203.55	102
1213.23									
GR	104	1222.26	106	1230.67	108	1242.3	110	1253.92	
X1	31000	25	1166.79	1170.96	89.93	96.96	95.84		
GR	110	1000	108	1007.65	106	1015.31	104	1032.29	102
1042.61									
GR	100	1057.29	98	1074.49	96	1095.15	94	1115.66	92
1161.69									
GR	90	1166.79	89	1167.3	89	1170.4	90	1170.96	90
1170.96									
GR	92	1174.24	94	1177.76	96	1181.23	98	1184.76	100
1189.25									
GR	102	1205.06	104	1220.52	106	1239.16	108	1256.19	110
1279.73									
NC	0.14	0.14	0.052						
X1	31100	24	1176.26	1179.06	99.68	122.89	105.22		
GR	112	1000	110	1008.31	108	1016.63	106	1028.56	104
1041.71									
GR	102	1054.38	100	1079.47	98	1111.65	96	1141.75	94
1169.32									
GR	92	1176.26	89.5	1176.7	89.5	1178.6	92	1179.06	94
1186.93									
GR	96	1201.58	98	1227.03	100	1255.68	102	1291.03	104
1311.53									

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GR	106	1331.11	108	1350.74	110	1371.26	112	1393.44	
NC	0.09	0.09	0.035						
X1	31200	16	1130	1170	97.31	110.31	104.34		
GR	108	1000	106	1012.71	104	1029.36	102	1057.52	100
1074.81									
GR	97.4	1130	96	1131	96	1169	97.4	1170	97.4
1170									
GR	98	1173.87	100	1178.78	102	1183.89	104	1208.23	106
1225.45									
GR	108	1314.4							
NC	0.11	0.11	0.035						
X1	31300	23	1214	1216	98.05	102.34	99.82		
GR	120	1000	118	1015.03	116	1028.02	114	1039.49	112
1049.02									
GR	110	1058.87	108	1090.01	106	1106.54	104	1125.1	102
1162.48									
GR	100.3	1214	99.97	1214	99.97	1216	100.3	1216	102
1269.76									
GR	104	1280.24	106	1290.48	108	1300.86	110	1316.21	112
1331.91									
GR	114	1346.4	116	1357.85	118	1369.68			
X1	31400	32	1238	1240	53.08	128.43	90.18		
GR	124	1000	122	1012	120	1025.58	118	1038.79	116
1046.56									
GR	114	1054.53	112	1079.31	112	1095.44	112	1098.47	110
1116.92									
GR	108	1138.32	106	1160.07	104	1176.68	102	1201.64	101.9
1238									
GR	101.56	1238	101.56	1240	101.9	1240	102	1259.79	102
1278.22									
GR	102	1286.86	104	1300.87	106	1312.66	108	1322.42	110
1332.69									
GR	112	1343.76	114	1354.31	116	1365.29	118	1377.9	120
1391.38									
GR	122	1409.65	124	1422.62					
NC	0.1	0.1	0.052						
X1	31500	28	1226.24	1245.78	67.63	130.11	98.64		
GR	124	1000	122	1011.51	120	1020.02	118	1030.14	118
1030.23									
GR	118	1050.86	116	1075.13	114	1091.34	112	1107.4	110
1126.99									
GR	108	1149.48	106	1168.37	104	1186.48	104	1203.17	104
1226.24									
GR	102	1227	102	1245	104	1245.78	106	1247.11	108
1249.08									
GR	110	1254.8	112	1260.62	114	1266.43	116	1272.23	118
1278.12									
GR	120	1283.87	122	1289.6	124	1295.1			
X1	31600	30	1160.13	1182.13	110.26	88.09	130.04		
GR	130	1000	128	1006.34	126	1014.36	124	1025.61	122
1036.94									
GR	120	1048.12	118	1059.21	116	1070.3	114	1088.2	112
1107.12									
GR	110	1129.23	108	1153.28	106	1156.56	104	1160.13	102.5
1161									
GR	102.5	1181.26	104	1182.13	106	1185.51	108	1191.13	110
1204.18									
GR	112	1226.33	114	1240.53	116	1249.91	118	1259.29	120
1268.72									
GR	122	1277.47	124	1283.71	126	1290	128	1296.29	130
1302.6									
X1	31700	30	1157.01	1176.9	109.22	72.2	102.16		
GR	134	1000	132	1006.19	130	1012.97	128	1020.19	126
1036.82									
GR	124	1046.94	122	1056.78	120	1068.46	118	1084.03	116
1099.69									
GR	114	1120.91	112	1143.75	110	1153.02	108	1157.01	106
1157.8									
GR	106	1176	108	1176.9	110	1190.31	112	1224.95	114
1244.8									

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GR	116	1260.99	118	1272.09	120	1282.29	122	1291.92	124
1300									
GR	126	1308.02	128	1315.01	130	1322.53	132	1329.95	134
1337.45									
X1	31800	28	1182.48	1196.59	118.76	51.89	110.7		
GR	136	1000	134	1009.25	132	1019.37	130	1030.48	128
1041.74									
GR	126	1054.01	124	1066.37	122	1078.75	120	1095.56	118
1116.8									
GR	116	1140.83	114	1168.04	112	1182.48	110	1193.2	110
1195.9									
GR	112	1196.59	114	1212.12	116	1236.26	118	1256.92	120
1275.61									
GR	122	1291.51	124	1306.94	126	1317.89	128	1328.63	130
1339.06									
GR	132	1349.01	134	1358.12	136	1367			
X1	31900	28	1214.75	1230.2	136.68	64.44	122.36		
GR	138	1000	136	1016.6	134	1035.29	132	1053.99	130
1067.96									
GR	128	1082.15	126	1100.76	124	1120.73	122	1135.96	120
1152.49									
GR	118	1195.57	116	1209.72	114	1214.75	112	1215.5	112
1229.7									
GR	114	1230.2	116	1248.88	118	1263.42	120	1276.48	122
1289.33									
GR	124	1305	126	1317.32	128	1328.69	130	1340.06	132
1352.3									
GR	134	1365.54	136	1379.22	138	1393.06			
X1	32000	26	1258.05	1274.71	107.6	109.11	114.38		
GR	138	1000	136	1026.78	134	1059.3	132	1092.14	130
1110.9									
GR	128	1129.25	126	1147.12	124	1166.74	122	1194.43	120
1220.11									
GR	118	1248.99	116	1258.05	114.2	1259	114.2	1273.75	116
1274.71									
GR	118	1278.98	120	1286.79	122	1299.32	124	1308.46	126
1315.47									
GR	128	1322.58	130	1329.58	132	1336.49	134	1342.9	136
1349.54									
GR	138	1357.41							
X1	32050	23	1189.82	1207.61	51.49	51.5	51.18		
X3	0								
GR	140	1000	138	1021.24	136	1032.95	134	1043.68	118
1057.06									132
GR	130	1069.95	128	1084.31	126	1100.92	124	1115.85	122
1136.1									
GR	120	1156.75	118	1189.82	116	1195.97	115	1196.72	115
1204.51									
GR	116	1205.26	118	1207.61	120	1209.83	122	1225.58	124
1235.4									
GR	126	1244.94	128	1254.13	130	1263.17			

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30001.000.

STATUS: (3265) Divided flow.

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Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONT
30001.000	0.000	0.105	0.000	1.50	71.50	0.00	71.50
0.053062	0	0	0	71.61	0.11	0.00	0.00
0.00	0	333	0	0.00	72.00	72.00	0
898	0	898	0	445.1	1106.48	1753.26	0
0.00	0.00	2.69	0.00	0.000	0.0	70.00	0

STATUS: Analyzing cross-section reach 30002.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.75

30002.000	0.000	0.105	0.000	1.18	75.18	0.00	0.00
0.017350	172	129	110	75.24	0.06	3.63	0.00
1.16	0	446	0	0.00	76.00	76.00	4
898	0	898	0	399.1	1055.16	1454.30	0
0.02	0.00	2.01	0.00	0.000	1.3	74.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.68

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
30100.000	0.110	0.105	0.110	1.68	78.68	0.00	0.00
0.038036	167	145	194	78.89	0.20	3.60	0.04
2.33	1	244	6	0.00	78.00	78.00	5
898	1	898	8	184.7	1046.27	1230.94	0
0.03	1.28	3.63	1.29	0.000	2.2	77.00	0

STATUS: Analyzing cross-section reach 30200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

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	Upstream to Downstream Conveyance Ratio (KEFATIO)						1.72
30200.000	0.110	0.105	0.110	2.86	80.85	0.00	0.00
0.012951	89	101	106	80.99	0.13	2.09	0.01
2.99	0	310	1	0.00	80.00	80.00	3
898	0	898	0	134.0	1042.69	1176.73	0
0.04	0.84	2.88	0.85	0.000	2.6	78.00	0

STATUS: Analyzing cross-section reach 30300.000.

30300.000	0.110	0.105	0.110	3.56	82.56	0.00	0.00
0.024504	86	101	101	82.77	0.21	1.76	0.02
3.63	0	244	0	0.00	82.00	82.00	3
898	0	897	0	116.6	1059.19	1175.78	0
0.05	0.85	3.68	0.87	0.000	2.9	79.00	0

STATUS: Analyzing cross-section reach 30400.000.

30400.000	0.110	0.105	0.110	4.44	84.94	0.00	0.00
0.022937	90	100	103	85.14	0.20	2.37	0.00
4.21	0	250	2	0.00	84.00	84.00	3
896	1	894	2	122.2	1055.77	1177.98	0
0.05	1.15	3.57	1.21	0.000	3.2	80.50	0

STATUS: Analyzing cross-section reach 30500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

30500.000	0.110	0.040	0.110	4.56	86.56	86.56	0.00
0.011194	99	114	107	87.58	1.02	1.75	0.25
4.77	112	71	9	0.00	84.00	84.00	3
898	213	668	16	105.7	1071.03	1176.71	8
0.06	1.89	9.35	1.78	0.000	3.5	82.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30550.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

30550.000	0.110	0.040	0.110	5.09	87.29	87.29	0.00
0.014953	54	54	54	88.47	1.18	0.71	0.05
4.97	21	9	2	0.00	86.00	86.00	2
898	26	868	2	72.5	1126.06	1198.58	8
0.06	1.23	8.87	1.19	0.000	3.6	82.20	0

STATUS: Analyzing cross-section reach 30600.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

30600.000	0.110	0.040	0.110	6.87	88.87	88.87	0.00
0.011776	114	102	103	90.02	1.15	1.39	0.00
5.37	131	47	20	0.00	84.00	84.00	3
898	319	522	56	90.1	1092.66	1182.78	11
0.06	2.44	11.07	2.75	0.000	3.8	82.00	0

STATUS: Analyzing cross-section reach 30700.000.

30700.000	0.110	0.040	0.110	7.67	90.67	0.00	0.00
0.015711	112	93	91	91.43	0.75	1.37	0.04
5.87	138	16	54	0.00	84.00	84.00	4
898	457	210	230	90.6	1169.64	1260.20	0

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0.07 3.31 12.79 4.22 0.000 4.0 83.00 0

STATUS: Analyzing cross-section reach 30800.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

30800.000	0.110	0.040	0.110	6.03	91.58	91.41	0.00
0.009453	128	101	92	92.90	1.33	1.30	0.17
8.38	63	70	22	0.00	88.00	88.00	6
898	123	725	49	72.2	1125.06	1197.28	12
0.07	1.93	10.24	2.17	0.000	4.2	85.50	0

STATUS: Analyzing cross-section reach 30900.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

30900.000	0.110	0.040	0.110	7.90	93.90	0.00	0.00
0.017989	103	101	106	94.30	0.41	1.31	0.09
6.80	166	13	37	0.00	88.00	89.00	4
898	609	134	153	83.0	1113.99	1197.00	0
0.00	3.66	9.78	4.08	0.000	4.4	86.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30950.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

30950.000	0.110	0.040	0.110	5.96	93.96	93.90	0.00
0.010898	50	50	50	95.26	1.30	0.69	0.27
7.00	49	86	4	0.00	92.00	92.00	6
998	68	824	5	74.9	1112.03	1186.96	16
0.08	1.39	9.54	1.30	0.000	4.5	88.00	0

FLOW DISTRIBUTION :

Cross-Section Number (SECNO) 30950.000
 Total Discharge (cfs, Q) 898
 Computed Water Surface Elevation (ft MSL, CWSEL) 93.96

Station (ft) =	1112.0	1162.1	1182.8	1187.0
Flow (ft/s)	= 7.6	91.8	0.6	
Area (sq ft)	= 49.1	86.4	4.1	
Vel (ft/s)	= 1.39	9.54	1.30	
Depth (ft)	= 0.98	4.17	0.98	

STATUS: Analyzing cross-section reach 31000.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

31000.000	0.110	0.040	0.110	6.50	95.50	95.50	0.00
0.014804	89	95	96	96.64	1.13	1.12	0.02
7.36	149	26	25	0.00	90.00	90.00	2
898	462	349	86	80.1	1100.25	1180.37	8
0.08	3.09	13.13	3.38	0.000	4.7	89.00	0

STATUS: Analyzing cross-section reach 31100.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

31100.000	0.140	0.052	0.140	8.55	98.05	0.00	0.00
0.015481	99	105	122	98.33	0.28	1.61	0.09
7.96	150	22	111	0.00	92.00	92.00	3
898	408	178	310	116.9	1110.86	1227.73	0
0.09	2.71	7.83	2.80	0.000	4.9	89.50	0

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STATUS: Analyzing cross-section reach 31200.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

31200.000	0.090	0.035	0.090	2.82	98.82	98.58	0.00
0.009961	97	104	110	99.72	0.90	1.20	0.19
8.46	21	111	5	0.00	97.40	97.40	6
898	26	863	7	75.9	1099.93	1175.87	17
0.10	1.24	7.76	1.53	0.000	5.1	96.00	0

STATUS: Analyzing cross-section reach 31300.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31300.000	0.110	0.035	0.110	2.91	102.88	102.88	0.00
0.049999	88	99	102	103.53	0.66	1.73	0.02
8.83	96	5	94	0.00	100.30	100.30	20
898	398	92	406	128.2	1146.11	1274.35	8
0.10	4.15	15.99	4.29	0.000	5.4	99.97	0

STATUS: Analyzing cross-section reach 31400.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							2.40
31400.000	0.110	0.035	0.110	3.47	105.03	0.00	0.00
0.008685	53	90	128	105.17	0.14	1.59	0.05
9.40	167	6	175	0.00	101.90	101.90	4
898	406	51	440	138.9	1168.06	1306.99	0
0.11	2.42	7.47	2.51	0.000	5.6	101.56	0

STATUS: Analyzing cross-section reach 31500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							0.62
31500.000	0.100	0.052	0.100	3.69	105.68	105.68	0.00
0.022897	67	98	130	106.70	1.02	1.27	0.27
9.95	79	70	0	0.00	104.00	104.00	6
898	239	657	1	75.7	1171.20	1246.90	8
0.11	3.00	9.32	1.35	0.000	5.9	102.00	0

STATUS: Analyzing cross-section reach 31600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							1.58
31600.000	0.100	0.052	0.100	5.10	107.60	0.00	0.00
0.009162	110	130	88	108.46	0.86	1.74	0.02
10.35	11	110	12	0.00	104.00	104.00	2
898	25	847	25	36.1	1153.94	1190.00	0
0.12	2.21	7.64	2.07	0.000	6.0	102.50	0

STATUS: Analyzing cross-section reach 31700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

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WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31700.000	0.100	0.052	0.100	4.23	110.23	110.23	0.00
0.012763	109	102	72	111.76	1.53	1.39	0.20
10.52	5	82	15	0.00	108.00	108.00	20
898	11	643	42	42.3	1151.95	1194.30	14
0.12	2.34	10.24	2.50	0.000	6.1	106.00	0

STATUS: Analyzing cross-section reach 31800.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31800.000	0.100	0.052	0.100	4.99	114.99	114.99	0.00
0.018840	118	110	51	116.22	1.22	2.20	0.03
10.90	35	69	36	0.00	112.00	112.00	20
898	100	690	106	69.5	1154.55	1224.08	11
0.12	2.84	10.01	2.90	0.000	6.2	110.00	0

STATUS: Analyzing cross-section reach 31900.000.

31900.000	0.100	0.052	0.100	5.08	117.08	116.84	0.00
0.016473	136	122	64	118.26	1.18	2.04	0.00
11.24	14	77	43	0.00	114.00	114.00	4
898	36	736	125	54.6	1202.09	1256.72	8
0.13	2.48	9.54	2.91	0.000	6.3	112.00	0

STATUS: Analyzing cross-section reach 32000.000.

32000.000	0.100	0.052	0.100	4.71	118.91	118.91	0.00
0.020756	107	114	109	120.47	1.55	2.09	0.11
11.55	23	76	9	0.00	116.00	115.00	4
898	63	867	27	46.7	1235.82	1282.54	11
0.13	2.74	10.51	2.78	0.000	6.5	114.20	0

STATUS: Analyzing cross-section reach 32050.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

32050.000	0.100	0.052	0.100	5.45	120.45	120.45	0.00
0.018213	51	51	51	121.71	1.26	0.99	0.03
11.70	48	79	3	0.00	118.00	118.00	2
898	123	767	7	61.2	1152.14	1213.34	11
0.13	2.52	9.70	1.83	0.000	6.5	115.00	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

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SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS
 ----- WATERSHED 3 POST-DEVELOPMENT
 99-33-01

Cross- Cross- Section Section Number Area (sq ft) SECNO AREA	Channel Index Q Reach (0.01 * Length Convey.) (ft) XLOH .01K	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Computed Flow (cfs) Q	W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH
30001.000	0.00	0.00	0.00	70.00	898.17	71.50	0.00	71.61	530.62	2.69
333.80	38.99									
* 30002.000	129.11	0.00	0.00	74.00	898.17	75.18	0.00	75.24	173.50	2.01
446.90	68.19									
* 30100.000	145.41	0.00	0.00	77.00	898.17	78.68	0.00	78.89	380.36	3.63
252.42	46.05									
* 30200.000	101.38	0.00	0.00	78.00	898.17	80.86	0.00	80.99	129.31	2.88
312.85	78.98									
30300.000	101.26	0.00	0.00	79.00	898.17	82.56	0.00	82.77	245.04	3.68
244.99	57.38									
30400.000	100.00	0.00	0.00	80.50	898.17	84.94	0.00	85.14	229.37	3.57
253.48	59.31									
* 30500.000	114.82	0.00	0.00	82.00	898.17	86.56	86.56	87.58	111.94	9.35
193.60	84.89									
* 30550.000	54.83	0.00	0.00	82.20	898.17	87.29	87.29	88.47	149.53	8.87
122.23	73.45									
* 30600.000	102.26	0.00	0.00	82.00	898.17	88.87	88.87	90.02	117.76	11.07
198.70	82.77									
30700.000	93.75	0.00	0.00	83.00	898.17	90.67	0.00	91.43	157.11	12.79
209.24	71.66									
30800.000	101.14	0.00	0.00	85.50	898.17	91.58	91.41	92.90	94.53	10.24
157.56	92.38									
30900.000	101.35	0.00	0.00	86.00	898.17	93.90	0.00	94.30	179.89	9.78
218.07	66.97									
30950.000	50.00	0.00	0.00	88.00	898.17	93.96	93.90	95.26	108.98	9.54
139.62	86.04									
* 31000.000	95.84	0.00	0.00	89.00	898.17	95.50	95.50	96.64	148.04	13.13
201.89	73.82									
31100.000	105.22	0.00	0.00	89.50	898.17	98.05	0.00	98.33	154.81	7.83
284.63	72.19									
31200.000	104.34	0.00	0.00	96.00	898.17	98.82	98.58	99.72	89.61	7.76
137.70	94.88									
* 31300.000	99.82	0.00	0.00	99.97	898.17	102.88	102.86	103.53	499.99	15.99
196.67	40.17									
* 31400.000	90.18	0.00	0.00	101.56	898.17	105.03	0.00	105.17	86.85	7.47
349.61	96.38									
* 31500.000	98.64	0.00	0.00	102.00	898.17	105.68	105.68	106.70	228.97	9.32
151.46	59.36									
* 31600.000	130.04	0.00	0.00	102.50	898.17	107.60	0.00	108.46	91.62	7.64
134.60	93.84									
* 31700.000	102.16	0.00	0.00	106.00	898.17	110.23	110.23	111.76	227.63	10.24
104.45	59.53									

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* 31800.000	110.70	0.00	0.00	110.00	898.17	114.99	114.99	115.22	188.40	10.01
141.31	65.44									
31900.000	122.36	0.00	0.00	112.00	898.17	117.08	116.84	118.26	164.73	9.54
134.80	69.98									
32000.000	114.38	0.00	0.00	114.20	898.17	118.91	118.91	120.47	207.56	10.51
109.91	62.34									
* 32050.000	51.18	0.00	0.00	115.00	898.17	120.45	120.45	121.71	182.13	9.70
121.98	66.55									

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS

----- WATERSHED 3 POST-DEVELOPMENT
 99-33-01

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
30001.000	898.17	71.50	0.00	0.00	0.00	445.06	0.00
* 30002.000	898.17	75.18	0.00	3.68	0.00	399.14	129.11
* 30100.000	898.17	78.68	0.00	3.50	0.00	184.67	145.41
* 30200.000	898.17	80.86	0.00	2.17	0.00	134.04	101.38
30300.000	898.17	82.56	0.00	1.70	0.00	116.60	101.26
30400.000	898.17	84.94	0.00	2.38	0.00	122.21	100.00
* 30500.000	898.17	86.56	0.00	1.61	0.00	105.68	114.82
* 30550.000	898.17	87.29	0.00	0.74	0.00	72.52	54.83
* 30600.000	898.17	88.87	0.00	1.58	0.00	90.12	102.26
30700.000	898.17	90.67	0.00	1.81	0.00	90.56	93.75
30800.000	898.17	91.58	0.00	0.90	0.00	72.22	101.14
30900.000	898.17	93.90	0.00	2.32	0.00	83.02	101.35
30950.000	898.17	93.96	0.00	0.07	0.00	74.93	50.00
* 31000.000	898.17	95.50	0.00	1.54	0.00	80.12	95.84
31100.000	898.17	98.05	0.00	2.55	0.00	116.87	105.22
31200.000	898.17	98.82	0.00	0.77	0.00	75.94	104.34
* 31300.000	898.17	102.68	0.00	4.06	0.00	128.24	99.82
* 31400.000	898.17	105.03	0.00	2.16	0.00	138.92	90.18
* 31500.000	898.17	105.68	0.00	0.65	0.00	75.70	98.64
* 31600.000	898.17	107.60	0.00	1.92	0.00	36.06	130.04
* 31700.000	898.17	110.23	0.00	2.63	0.00	42.35	102.16
* 31800.000	898.17	114.99	0.00	4.76	0.00	69.53	110.70
31900.000	898.17	117.08	0.00	2.09	0.00	54.62	122.36
32000.000	898.17	118.91	0.00	1.83	0.00	46.72	114.38
* 32050.000	898.17	120.45	0.00	1.53	0.00	61.20	51.18

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SUMMARY OF WARNING AND STATUS MESSAGES :

Section 30002, profile 1, conveyance change outside acceptable range.
Section 30100, profile 1, conveyance change outside acceptable range.
Section 30200, profile 1, conveyance change outside acceptable range.
Section 30500, profile 1, critical depth assumed.
Section 30500, profile 1, minimum specific energy.
Section 30550, profile 1, critical depth assumed.
Section 30550, profile 1, minimum specific energy.
Section 30600, profile 1, critical depth assumed.
Section 30600, profile 1, minimum specific energy.
Section 31000, profile 1, critical depth assumed.
Section 31000, profile 1, minimum specific energy.
Section 31300, profile 1, critical depth assumed.
Section 31300, profile 1, probable minimum specific energy.
Section 31300, profile 1, 20 trials attempted to balance water surface elevation.
Section 31400, profile 1, conveyance change outside acceptable range.
Section 31500, profile 1, conveyance change outside acceptable range.
Section 31600, profile 1, conveyance change outside acceptable range.
Section 31700, profile 1, critical depth assumed.
Section 31700, profile 1, probable minimum specific energy.
Section 31700, profile 1, 20 trials attempted to balance water surface elevation.
Section 31800, profile 1, critical depth assumed.
Section 31800, profile 1, probable minimum specific energy.
Section 31800, profile 1, 20 trials attempted to balance water surface elevation.
Section 32050, profile 1, critical depth assumed.
Section 32050, profile 1, minimum specific energy.
25 Warning and status message(s) generated

END OF OUTPUT

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BOSS RMS for AutoCAD HEC-2 Analysis version 2000
PROJECT TITLE : FOUR SEASONS
PROJECT NUMBER : 99-33-01

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Version : 2000

PROGRAM ORIGIN :

BOSS RMS for AutoCAD HEC-2 Analysis uses the standard 4.6.2 version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 Program for water-surface profile computations. This HEC-2 program was released on September 1990, last updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 3 POST-DEVELOPMENT *W/ POND*
ENGINEER : ROBERT BUTLER
DATE OF RUN : 9/27/2002
TIME OF RUN : 1:17 pm

T1 99-33-01
T2 FOUR SEASONS
T3 WATERSHED 3 POST-DEVELOPMENT
T4 STARTING ELEVATION AT DOWNSTREAM CROSS SECTION 30001 OBTAINED FROM
T4 POWELLS CREEK WATERSHED STUDY

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2						484.37	71.5	
J2	NPROF	IPLT	PREVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1		-1					-6		
NC	0.11	0.11	0.105	0.1	0.3					
X1	30001	14	1096.27	1766.59						
GR	80	1000	78	1020.49	76	1040.98		74	1061.67	72
1096.27										
GR	70	1137.1	72	1350.49	72	1427.39		70	1713.25	72
1766.59										
GR	74	1802.14	76	1831.84	78	1844.68		80	1855.33	
X1	30002	10	1045.18	1473.9	172.88	110.26		129.11		

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GR	82	1000	80	1014.64	78	1029.74	76	1045.18	74
1069.61									
GR	74	1425.9	76	1473.9	78	1490.18	80	1504.17	82
1518.16									
NC	0.11	0.11	0.105	0.1	0.3				
X1	30100	14	1050.08	1212.37	167.6	194.85	145.41		
GR	88	1000	86	1009.33	84	1018.71	82	1028.33	80
1038.95									
GR	78	1050.08	77	1065	77	1170	78	1212.37	80
1266.62									
GR	82	1311.7	84	1351.39	86	1383.92	88	1417.48	
X1	30200	20	1044.95	1174.08	89.33	106.59	101.39		
GR	94	1000	92	1006.87	90	1013.71	88	1020.54	86
1027.1									
GR	84	1033.61	82	1039.7	80	1044.95	78	1097.44	78
1136.91									
GR	78	1164.85	78	1168.04	80	1174.08	82	1180.25	84
1188.77									
GR	86	1205.18	88	1222.74	90	1237.84	92	1252.5	94
1268.67									
X1	30300	23	1060.39	1174.08	86.77	101	101.26		
GR	98	1000	96	1008.43	94	1017.04	92	1026	90
1034.95									
GR	88	1043.86	86	1051.89	84	1056.07	82	1060.39	80
1105.96									
GR	80	1131.41	80	1158.57	79	1163	80	1168.1	82
1174.08									
GR	84	1180.16	86	1186.03	88	1192.17	90	1198.14	92
1204.19									
GR	94	1211.61	96	1218.44	98	1224.64			
X1	30400	20	1057.76	1173.26	90.12	103.46	100		
GR	100	1000	98	1008.38	96	1016.58	94	1024.92	92
1033.38									
GR	90	1042.01	88	1049.58	86	1053.5	84	1057.76	82
1153.5									
GR	80.5	1165	82	1169.01	84	1173.26	86	1183.39	88
1201.02									
GR	90	1214.37	92	1225.39	94	1237.63	96	1254.46	98
1270									
NC	0.11	0.11	0.04						
X1	30500	22	1150.19	1169.08	99.46	107.83	114.82		
GR	102	1000	100	1008.72	98	1017.34	96	1025.96	94
1034.41									
GR	92	1041.47	90	1045.6	88	1049.66	86	1079.26	84
1150.19									
GR	82	1159.8	82	1164.1	84	1169.08	86	1174.85	88
1181.55									
GR	90	1186.44	92	1191.46	94	1194.98	96	1203.08	98
1211.63									
GR	100	1219.74	102	1227.79					
NC	0.11	0.11	0.04	0.1	0.3				
X1	30550	20	1156.93	1167.04	54.83	54.83	54.83		
X3	0							84	84
GR	100	1019.01	98	1027.82	96	1049.03	94	1065.77	92
1078.92									
GR	90	1092.43	88	1107.5	86	1137.47	84	1156.93	82
1159.49									
GR	82	1164.49	84	1167.04	86	1173.53	88	1179.44	90
1187.06									
GR	92	1195.47	94	1203.81	96	1212.13	98	1220.63	100
1229.23									
X1	30600	21	1135.22	1184.77	48.77	48.77	48.75		
X3	0							86	86
GR	104	1000	102	1010.16	100	1022.26	98	1034.82	96
1048.27									
GR	94	1061.56	90	1083.22	88	1107.41	86	1135.22	84
1167.78									
GR	84	1177.62	86	1184.77	88	1190.46	90	1197.61	92
1204.64									

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GR	94	1212.19	96	1218.4	98	1225.02	100	1231.54	102
1238.9									
GR	104	1245.93							
NC	0.11	0.11	0.04	0.1	0.3				
SC	1.013	0.5	3	365	5		222	1.2	89.5
84.6									
X1	30900	29	1100.23	1143.8	300	300	300		
RC	1	375.84	106.58						
X2			2		112				
X3	0							92	92
GR	120	1000	118	1005.93	116	1011.6	114	1017.53	112
1023.46									
GR	110	1029.13	108	1034.54	106	1040.47	104	1044.86	102
1063.15									
GR	100	1074.23	98	1081.95	96	1086.39	94	1094.57	92
1100.23									
GR	90	1107.71	90	1134.24	92	1143.8	94	1153.85	96
1164.15									
GR	98	1173.68	100	1183.22	102	1192.75	104	1202.8	106
1211.3									
GR	108	1221.62	110	1231.42	112	1240.19	114	1254.62	
NC				0.3	0.5				
QT	1	789.64							
X1	30950	27	1095.55	1138.46	49.9	49.67	47.26		
X3	0							94	94
GR	114	1000	112	1010.52	110	1014.84	108	1017.56	108
1030.87									
GR	106	1039.69	104	1048.22	102	1056.74	100	1065.26	98
1078.86									
GR	96	1087.76	94	1095.55	92	1103.75	91	1106.75	91
1126.22									
GR	92	1129.22	94	1138.46	96	1147.32	98	1156.12	100
1165.43									
GR	102	1174.28	104	1183.09	106	1191.89	108	1201.23	110
1210.87									
GR	112	1219.28	114	1228.09					
NC	0.11	0.11	0.04	0.1	0.3				
X1	31000	21	1089.1	1115.13	39.24	44.12	41.93		
X3	0							94	94
GR	110	1000	108	1007.65	106	1015.31	104	1032.29	102
1042.61									
GR	100	1057.29	98	1071.39	96	1080.7	94	1089.1	92
1098.31									
GR	92	1108.92	94	1115.13	96	1122.13	98	1129.24	100
1136.34									
GR	102	1142.95	104	1150.45	106	1157.47	108	1164.52	110
1172.07									
GR	112	1179.07							
NC	0.14	0.14	0.052						
X1	31100	18	1111.65	1166.51	99.68	122.89	105.22		
X3	0							98	98
GR	112	1000	110	1008.31	108	1016.63	106	1028.56	104
1041.71									
GR	102	1054.38	100	1079.47	98	1111.65	96	1141.75	96
1158.1									
GR	98	1166.51	100	1176.25	102	1186.36	104	1196.47	106
1206.68									
GR	108	1217.69	110	1228.33	112	1238.06			
NC	0.09	0.09	0.035						
X1	31200	16	1130	1170	97.31	110.31	104.34		
GR	108	1000	106	1012.71	104	1029.36	102	1057.52	100
1074.81									
GR	97.4	1130	96	1131	96	1169	97.4	1170	97.4
1170									
GR	98	1173.87	100	1178.78	102	1183.89	104	1208.23	106
1225.45									
GR	108	1314.4							
NC	0.11	0.11	0.035						
X1	31300	23	1214	1216	88.05	102.34	99.82		

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GR	120	1000	118	1015.03	116	1028.02	114	1039.49	112
1049.02									
GR	110	1058.87	108	1090.01	106	1106.54	104	1125.1	102
1162.43									
GR	100.3	1214	99.97	1214	99.97	1216	100.3	1216	100
1269.76									
GR	104	1280.24	106	1290.48	108	1300.86	110	1316.21	112
1331.91									
GR	114	1346.4	116	1357.85	118	1369.69			
X1	31400	32	1238	1240	53.08	128.43	90.18		
GR	124	1000	122	1012	120	1025.58	118	1038.79	116
1046.56									
GR	114	1054.53	112	1079.31	112	1095.44	112	1098.47	110
1116.92									
GR	108	1138.32	106	1160.07	104	1176.68	102	1201.64	101.9
1238									
GR	101.56	1238	101.56	1240	101.9	1240	102	1259.79	102
1278.22									
GR	102	1286.86	104	1300.87	106	1312.65	108	1322.42	110
1332.69									
GR	112	1343.76	114	1354.31	116	1365.29	118	1377.9	120
1391.38									
GR	122	1409.65	124	1422.62					
NC	0.1	0.1	0.052						
X1	31500	28	1226.24	1245.78	67.63	130.11	98.64		
GR	124	1000	122	1011.51	120	1020.02	118	1030.14	118
1030.23									
GR	118	1050.86	116	1075.13	114	1091.34	112	1107.4	110
1126.99									
GR	108	1149.48	106	1168.37	104	1186.48	104	1203.17	104
1226.24									
GR	102	1227	102	1245	104	1245.78	106	1247.11	108
1249.08									
GR	110	1254.78	112	1260.62	114	1266.43	116	1272.23	118
1278.12									
GR	120	1283.87	122	1289.6	124	1295.1			
X1	31600	30	1160.13	1182.13	110.26	88.09	130.04		
GR	130	1000	128	1006.34	126	1014.36	124	1025.61	122
1036.94									
GR	120	1048.12	118	1059.21	116	1070.3	114	1088.2	112
1107.12									
GR	110	1129.23	108	1153.28	106	1156.56	104	1160.13	102.5
1161									
GR	102.5	1181.26	104	1182.13	106	1185.51	108	1191.13	110
1204.18									
GR	112	1226.33	114	1237.04	116	1243.95	118	1252.25	120
1260.52									
GR	122	1269.01	124	1278.61	126	1286.63	128	1293.83	130
1302.6									
X1	31700	30	1157.01	1176.9	109.22	72.2	102.16		
GR	134	1000	132	1006.19	130	1012.97	128	1020.19	126
1036.82									
GR	124	1046.94	122	1056.78	120	1068.46	118	1084.03	116
1099.69									
GR	114	1120.91	112	1143.75	110	1153.02	108	1157.01	106
1157.8									
GR	106	1176	108	1176.9	110	1190.31	112	1224.95	114
1244.8									
GR	116	1254.43	118	1262.18	120	1271.81	122	1280.62	124
1289.43									
GR	126	1298.28	128	1306.24	130	1312.5	132	1329.95	134
1337.45									
X1	31800	27	1094.77	1108.88	118.76	51.89	110.7		
GR	136	1000	134	1007.01	132	1013.67	130	1020.73	128
1027.78									
GR	126	1034.84	124	1042.38	122	1051.77	120	1064.58	115.2
1064.58									
GR	114	1080.84	112	1094.77	110	1095.49	110	1108.19	112
1108.88									
GR	114	1124.41	116	1148.55	118	1169.21	120	1187.9	122
1203.8									

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GR	124	1219.23	126	1230.18	128	1241.13	130	1251.56	132
1261.51									
GR	134	1270.62	136	1279.5					
X1	31900	19	1053.77	1069.22	136.69	64.44	122.36		
GR	132	1000	130	1015.83	128	1029.28	127	1037.56	117.63
1037.56									
GR	116	1048.8	114	1053.77	112	1054.52	112	1058.72	114
1069.22									
GR	116	1087.87	118	1102.06	120	1115.16	122	1127.63	124
1142.02									
GR	126	1151.22	128	1161.66	130	1173.88	132	1188.1	
X1	32000	16	1128.8	1145.46	107.6	109.11	114.38		
GR	128	1000	126	1017.87	124	1037.49	122	1065.18	120
1090.86									
GR	118	1119.74	116	1128.8	114.2	1129.75	114.2	1144.5	116
1145.46									
GR	118	1149.73	120	1157.54	122	1170.07	124	1179.21	126
1186.22									
GR	128	1193.33							
X1	32050	23	1189.82	1207.61	51.49	51.18	51.5		
GR	140	1000	138	1021.24	136	1032.95	134	1043.68	132
1057.06									
GR	130	1069.95	128	1084.31	126	1100.92	124	1115.85	122
1136.1									
GR	120	1156.75	118	1189.82	116	1195.97	115	1196.72	115
1204.51									
GR	116	1205.26	118	1207.61	120	1209.83	122	1225.58	124
1235.4									
GR	126	1244.94	128	1254.13	130	1263.17			

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30001.000.

STATUS: (3265) Divided flow.

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length XLOBL (ft)	Channel Length XLCH (ft)	Right Overbank Length XLOBR (ft)	Energy Gradient EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Flow Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONT

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30001.000	0.000	0.105	0.000	1.50	71.50	0.00	71.50
0.015432	0	0	0	71.53	0.03	0.00	0.00
0.00	0	333	0	0.00	71.00	72.00	0
484	0	484	0	445.1	1106.48	1753.26	0
0.00	0.00	1.45	0.00	0.000	0.0	70.00	0

STATUS: Analyzing cross-section reach 30002.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							0.59
30002.000	0.000	0.105	0.000	0.62	74.62	0.00	0.00
0.044163	172	129	110	74.69	0.07	3.15	0.01
0.83	0	228	0	0.00	76.00	76.00	4
484	0	484	0	378.8	1062.02	1440.81	0
0.02	0.00	2.12	0.00	0.000	1.2	74.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							1.58
30100.000	0.110	0.105	0.110	1.49	78.49	0.00	0.00
0.017772	167	145	194	78.57	0.08	3.87	0.00
1.58	0	212	3	0.00	78.00	78.00	5
484	0	481	2	178.3	1047.36	1225.63	0
0.03	0.70	2.26	0.70	0.000	2.2	77.00	0

STATUS: Analyzing cross-section reach 30200.000.

30200.000	0.110	0.105	0.110	2.08	80.08	0.00	0.00
0.013972	89	101	106	80.16	0.08	1.59	0.00
2.07	0	209	0	0.00	80.00	80.00	4
484	0	484	0	129.6	1044.74	1174.32	0
0.05	0.02	2.31	0.02	0.000	2.5	78.00	0

STATUS: Analyzing cross-section reach 30300.000.

30300.000	0.000	0.105	0.000	2.87	81.87	0.00	0.00
0.024259	86	101	101	82.00	0.13	1.83	0.01
2.51	0	167	0	0.00	82.00	82.00	2
484	0	484	0	110.6	1063.08	1173.73	0
0.06	0.00	2.89	0.00	0.000	2.8	79.00	0

STATUS: Analyzing cross-section reach 30400.000.

30400.000	0.110	0.105	0.110	3.76	84.26	0.00	0.00
0.023247	90	100	103	84.38	0.12	2.37	0.00
2.90	0	172	0	0.00	84.00	84.00	4
484	0	484	0	117.4	1057.21	1174.57	0
0.07	0.02	2.81	0.52	0.000	3.1	80.50	0

STATUS: Analyzing cross-section reach 30500.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

30500.000	0.110	0.040	0.110	3.59	85.59	85.53	0.00
0.011964	99	114	107	86.45	0.86	1.85	0.22
3.26	44	53	3	0.00	84.00	84.00	6
484	56	422	4	79.9	1093.76	1173.67	9
0.07	1.27	7.94	1.22	0.000	3.3	82.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 30550.000.

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WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

30550.000	0.110	0.040	0.110	4.61	86.61	86.61	0.00
0.012063	54	54	54	87.79	1.19	0.66	0.10
3.38	34	41	10	0.00	84.00	84.00	20
484	65	398	20	47.0	1128.37	1175.32	11
0.07	1.92	9.60	1.91	0.000	3.4	32.00	0

STATUS: Analyzing cross-section reach 30600.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)							2.85
30600.000	0.110	0.040	0.110	3.92	87.92	0.00	0.00
0.001484	48	48	48	88.06	0.14	0.16	0.10
3.53	25	154	5	0.00	86.00	86.00	2
484	12	468	2	81.6	1108.57	1190.22	0
0.08	0.50	3.04	0.49	0.000	3.5	84.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Special culvert analysis being performed.

CULVERT DESCRIPTION :

Number of Identical Culverts (CUNO)	1
Culvert Mannings n (CUNV)	0.013
Culvert Entrance Loss Coefficient (ENTLC)	0.500
Pipe Culvert Diameter (ft, RISE)	5.00
Culvert Length (ft, CULVLN)	222.00
Culvert Opening Upstream Invert (ft MSL, ELCHU)	89.50
Culvert Opening Downstream Invert (ft MSL, ELCHD)	84.60
Roadway Length (ft, RDLEN)	365.00
Roadway Weir Flow Discharge Coefficient (COFQ)	3.00
Chart # 1 - concrete pipe culvert, no beveled ring entrance	
Scale # 2 - groove end entrance with headwall	

WARNING: (5140) Normal depth exceeds culvert height.

WARNING: (5130) Inlet control energy grade line elevation 110.91 ft MSL may be too large if inlet controls.

WARNING: (5135) Outlet control energy grade line elevation 101.99 ft MSL may be too large if outlet controls.

STATUS: Analyzing cross-section reach 30900.000.

SPECIAL CULVERT INLET CONTROL RESULTS :

Energy Grade Line Elevation for Inlet Control (ft MSL, EGIC)	110.91
Energy Grade Line Elevation for Outlet Control (ft MSL, EGOC)	101.99

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Previous Computed Water Surface Elevation (ft MSL, PCWSE) 87.92

Top of Roadway Elevation (ft MSL, ELTRD) 112.00

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 22.13

CULVERT ANALYSIS RESULTS :

Inlet Control Energy Grade Line Elevation (ft MSL, EGIC) 110.91

Outlet Control Energy Grade Line Elevation (ft MSL, EGOC) 101.99

Water Surface Drop Through Culvert (ft, H4) 22.86

Total Weir Flow (cfs, QWEIR) 0.

Total Culvert Flow (cfs, QCULV) 484.

Mean Channel Velocity (fps, VCH) 0.44

Culvert Opening Area (sq ft, ACULV) 19.6

Top of Roadway Elevation (ft MSL, ELTRD) 112.00

Roadway Weir Length (ft, WEIRLN) 0.0

30900.000	0.110	0.040	0.110	18.58	108.58	0.00	0.00
0.000003	300	300	300	108.58	0.00	22.86	0.00
11.05	532	792	674	0.00	92.00	92.00	0
484	55	351	76	191.5	1032.97	1224.46	0
0.31	0.10	0.44	0.11	0.000	4.4	90.00	0

Contraction Coefficient (CCHV) 0.300

Expansion Coefficient (CEHV) 0.500

STATUS: Analyzing cross-section reach 30950.000.

30950.000	0.110	0.040	0.110	17.58	108.58	0.00	0.00
0.000012	49	47	49	108.59	0.01	0.00	0.00
13.11	503	716	474	0.00	94.00	94.00	2
789	101	591	96	187.2	1016.77	1204.01	0
0.33	0.20	0.83	0.20	0.000	4.6	91.00	0

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 31000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.67

31000.000	0.110	0.040	0.110	16.57	108.57	0.00	0.00
0.000027	39	41	44	108.59	0.01	0.00	0.00
14.59	599	416	374	0.00	94.00	94.00	0
789	177	498	113	161.3	1005.44	1166.70	0
0.35	0.30	1.20	0.30	0.000	4.8	92.00	0

STATUS: Analyzing cross-section reach 31100.000.

31100.000	0.140	0.052	0.140	12.58	108.58	0.00	0.00
0.000035	99	105	122	108.59	0.01	0.00	0.00
18.21	635	651	280	0.00	98.00	98.00	0
789	155	571	62	206.5	1014.24	1220.75	0
0.39	0.24	0.88	0.22	0.000	5.2	96.00	0

STATUS: Analyzing cross-section reach 31200.000.

STATUS: (3280) For cross-section 31200.00, ends have been extended vertically 0.59 feet in order to calculate the hydraulic cross-section properties.

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PROJECT TITLE : FOUR SEASONS

PROJECT NUMBER : 99-R3-01

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WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.46

31200.000	0.090	0.035	0.090	12.59	108.59	0.00	0.00
0.000016	97	104	110	109.59	0.01	0.00	0.00
22.27	913	502	466	0.00	97.40	97.40	0
789	246	455	87	314.4	1000.00	1314.40	0
0.43	0.27	0.91	0.19	0.000	5.9	96.00	0

STATUS: Analyzing cross-section reach 31300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.30

31300.000	0.110	0.035	0.110	8.62	108.59	0.00	0.00
0.000184	88	99	102	108.60	0.01	0.00	0.00
25.64	687	17	513	0.00	100.30	100.30	0
789	422	34	332	224.5	1080.84	1305.38	0
0.47	0.62	2.00	0.65	0.000	5.4	99.97	0

STATUS: Analyzing cross-section reach 31400.000.

31400.000	0.110	0.035	0.110	7.05	108.61	0.00	0.00
0.000361	53	90	128	108.62	0.01	0.02	0.00
27.79	477	14	447	0.00	101.90	101.90	0
789	380	34	374	193.6	1131.91	1325.50	0
0.50	0.80	2.44	0.84	0.000	6.8	101.56	0

STATUS: Analyzing cross-section reach 31500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.54

31500.000	0.100	0.052	0.100	6.61	108.61	0.00	0.00
0.001258	67	98	130	108.70	0.10	0.06	0.03
29.23	280	127	8	0.00	104.00	104.00	2
789	370	413	5	108.1	1142.67	1250.81	0
0.51	1.32	3.24	0.70	0.000	7.2	102.00	0

STATUS: Analyzing cross-section reach 31600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.59

31600.000	0.100	0.052	0.100	6.13	108.63	0.00	0.00
0.003595	110	130	88	109.05	0.42	0.25	0.10
30.03	20	173	22	0.00	104.00	104.00	2
789	31	723	34	49.5	1145.76	1195.21	0
0.52	1.54	5.42	1.53	0.000	7.4	102.50	0

STATUS: Analyzing cross-section reach 31700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31700.000	0.100	0.052	0.100	3.81	109.81	109.81	0.00
0.026222	109	102	72	111.37	1.56	0.78	0.34
30.33	3	74	10	0.00	108.00	108.00	20
789	6	758	24	35.6	1153.40	1189.04	14
0.52	2.09	10.23	2.24	0.000	7.5	106.00	0

STATUS: Analyzing cross-section reach 31800.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

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PROJECT TITLE : FOUR SEASONS

PROJECT NUMBER : 99-33-01

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WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

31900.000	0.100	0.052	0.100	4.72	114.72	114.72	0.00
0.019175	118	110	51	115.92	1.20	2.39	0.04
30.57	27	65	29	0.00	112.00	112.00	20
789	74	633	81	62.0	1071.07	1133.12	14
0.52	2.69	9.72	2.74	0.000	7.6	110.00	0

STATUS: Analyzing cross-section reach 31900.000.

31900.000	0.100	0.052	0.100	4.87	116.87	0.00	0.00
0.015353	136	122	64	117.93	1.06	1.99	0.01
30.88	11	73	37	0.00	114.00	114.00	2
789	27	662	99	51.2	1042.81	1094.04	0
0.53	2.31	8.95	2.66	0.000	7.7	112.00	0

STATUS: Analyzing cross-section reach 32000.000.

32000.000	0.100	0.052	0.100	4.41	118.61	118.55	0.00
0.020889	107	114	109	120.07	1.46	2.02	0.12
31.16	17	71	7	0.00	116.00	116.00	4
789	45	724	19	41.3	1110.86	1152.13	11
0.53	2.61	10.09	2.59	0.000	7.8	114.20	0

STATUS: Analyzing cross-section reach 32050.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

32050.000	0.100	0.052	0.100	5.15	120.15	120.15	0.00
0.018967	51	51	51	121.39	1.24	1.02	0.02
31.29	38	73	2	0.00	118.00	118.00	2
789	85	699	4	55.9	1155.17	1211.03	11
0.53	2.24	9.46	1.78	0.000	7.9	115.00	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS

----- WATERSHED 3 POST-DEVELOPMENT

99-33-01

Cross- Section Number Area (sq ft) SECNO AREA	Channel Index Q Reach (0.01 * Length Convey.) (ft) XLCH .01K	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS	Energy Gradient Elevation (ft MSL) EG	Energy Gradient Slope * 10,000 10K*S	Channel Mean Flow Velocity (ft/s) VCH
30001.000 333.80	0.00 38.99	0.00	0.00	70.00	484.37	71.50	0.00	71.53	154.32	1.45
* 30002.000 228.28	129.11 23.05	0.00	0.00	74.00	484.37	74.62	0.00	74.69	441.63	2.12
* 30100.000 216.90	145.41 36.33	0.00	0.00	77.00	484.37	78.49	0.00	78.57	177.72	2.26
30200.000 209.87	101.38 40.98	0.00	0.00	78.00	484.37	80.08	0.00	80.16	139.72	2.31

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30300.000	101.26	0.00	0.00	79.00	484.37	81.87	0.00	82.00	242.59	2.89
167.33	31.10									
30400.000	100.00	0.00	0.00	80.50	484.37	84.26	0.00	84.38	232.47	2.81
172.80	31.70									
30500.000	100.82	0.00	0.00	82.00	484.37	85.59	85.53	86.45	119.64	7.94
101.80	44.28									
* 30550.000	54.83	0.00	0.00	82.00	484.37	86.61	86.61	87.79	120.63	9.60
86.48	44.10									
* 30600.000	48.75	0.00	0.00	84.00	484.37	87.92	0.00	88.06	14.84	3.04
185.10	125.76									
* 30900.000	300.00	112.00	0.00	90.00	789.64	108.58	0.00	108.58	0.03	0.44
1993.80	2782.52									
30950.000	47.26	0.00	0.00	91.00	789.64	108.58	0.00	108.59	0.12	0.83
1694.40	2293.05									
* 31000.000	41.93	0.00	0.00	92.00	789.64	108.57	0.00	108.59	0.27	1.20
1389.41	1531.86									
31100.000	105.22	0.00	0.00	96.00	789.64	108.58	0.00	108.59	0.35	0.88
1567.72	1333.05									
* 31200.000	104.34	0.00	0.00	96.00	789.64	108.59	0.00	108.59	0.16	0.91
1882.80	1948.05									
* 31300.000	99.82	0.00	0.00	99.97	789.64	108.59	0.00	108.60	1.84	2.00
1218.09	582.51									
31400.000	90.18	0.00	0.00	101.56	789.64	108.61	0.00	108.62	3.61	2.44
939.66	415.53									
* 31500.000	98.64	0.00	0.00	102.00	789.64	108.61	0.00	108.70	12.58	3.24
416.78	222.60									
* 31600.000	130.04	0.00	0.00	102.50	789.64	108.63	0.00	109.05	35.95	5.42
176.76	131.70									
* 31700.000	102.16	0.00	0.00	106.00	789.64	109.81	109.81	111.37	262.22	10.23
88.37	48.76									
* 31800.000	110.70	0.00	0.00	110.00	789.64	114.72	114.72	115.92	191.75	9.72
122.58	57.02									
31900.000	122.36	0.00	0.00	112.00	789.64	116.87	0.00	117.93	153.53	8.95
127.41	63.73									
32000.000	114.38	0.00	0.00	114.20	789.64	118.61	118.55	120.07	208.89	10.09
96.84	54.63									
* 32050.000	51.50	0.00	0.00	115.00	789.64	120.15	120.15	121.39	189.67	9.46
114.82	57.34									

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS
 ----- WATERSHED 3 POST-DEVELOPMENT
 99-33-01

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Elevation Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
30001.000	484.37	71.50	0.00	0.00	0.00	445.06	0.00
* 30002.000	484.37	74.62	0.00	3.12	0.00	378.78	129.11
* 30100.000	484.37	78.49	0.00	3.87	0.00	178.27	145.41
30200.000	484.37	80.08	0.00	1.59	0.00	129.58	101.38

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30300.000	484.37	81.87	0.00	1.80	0.00	110.64	101.26
30400.000	484.37	84.26	0.00	2.38	0.00	117.36	100.00
30500.000	484.37	85.59	0.00	1.33	0.00	79.91	114.82
* 30550.000	484.37	86.61	0.00	1.02	0.00	46.95	54.83
* 30600.000	484.37	87.92	0.00	1.31	0.00	81.65	48.75
* 30900.000	789.64	108.58	0.00	20.66	0.00	191.49	300.00
30950.000	789.64	108.58	0.00	0.00	0.00	187.24	47.26
* 31000.000	789.64	108.57	0.00	0.00	0.00	161.26	41.90
31100.000	789.64	108.58	0.00	0.01	0.00	206.52	105.22
* 31200.000	789.64	108.59	0.00	0.00	0.00	314.40	104.34
* 31300.000	789.64	108.59	0.00	0.00	0.00	224.54	99.82
31400.000	789.64	108.61	0.00	0.02	0.00	193.58	90.18
* 31500.000	789.64	108.61	0.00	0.00	0.00	108.14	98.64
* 31600.000	789.64	108.63	0.00	0.02	0.00	49.46	130.04
* 31700.000	789.64	109.81	0.00	1.19	0.00	35.64	102.16
* 31800.000	789.64	114.72	0.00	4.91	0.00	62.05	110.70
31900.000	789.64	116.87	0.00	2.15	0.00	51.23	122.36
32000.000	789.64	118.61	0.00	1.75	0.00	41.28	114.38
* 32050.000	789.64	120.15	0.00	1.54	0.00	55.86	51.50

SUMMARY OF WARNING AND STATUS MESSAGES :

Section 30002, profile 1, conveyance change outside acceptable range.

Section 30100, profile 1, conveyance change outside acceptable range.

Section 30550, profile 1, critical depth assumed.

Section 30550, profile 1, probable minimum specific energy.

Section 30550, profile 1, 20 trials attempted to balance water surface elevation.

Section 30600, profile 1, conveyance change outside acceptable range.

Section 30900, profile 1, conveyance change outside acceptable range.

Section 31000, profile 1, conveyance change outside acceptable range.

Section 31200, profile 1, conveyance change outside acceptable range.

Section 31300, profile 1, conveyance change outside acceptable range.

Section 31500, profile 1, conveyance change outside acceptable range.

Section 31600, profile 1, conveyance change outside acceptable range.

Section 31700, profile 1, critical depth assumed.

Section 31700, profile 1, probable minimum specific energy.

Section 31700, profile 1, 20 trials attempted to balance water surface elevation.

Section 31800, profile 1, critical depth assumed.

Section 31800, profile 1, probable minimum specific energy.

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9/27/2002

Section 31800, profile 1, 20 trials attempted to balance water surface elevation.

Section 32050, profile 1, critical depth assumed.

Section 32050, profile 1, minimum specific energy.

20 Warning and status message(s) generated

END OF OUTPUT

2H6V1453

5/09/2000

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Serial Number : 10120

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PROGRAM ORIGIN :

BOSS RiverCAD HEC-2 Analysis is an enhanced version of the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-2 program for water-surface profile computations. Program based upon the September 1990 version, updated on August 1991.

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PROJECT DESCRIPTION :

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
PROJECT NUMBER : 99-33-01
DESCRIPTION : WATERSHED 4 POST-DEVELOPMENT
ENGINEER : TIM EVERLY
DATE OF RUN : 5/09/2000
TIME OF RUN : 9:37 am

2H6V1454

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

T1	99-33-01
T2	FOUR SEASONS IN HIST. VA. - FLOODPLAIN STUDY
T3	WATERSHED 4 POST-DEVELOPMENT
T4	FLOW REDUCTION AT CROSS SECTION 40100 TO ACCOUNT FOR RUNOFF FROM
T4	WATERSHED 1
T4	DAM CROSS SECTION MODELED AT 43100

JOB PARAMETERS :

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q
	-10	2						905.31
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW
	-1		-1					-6

STATUS: Analyzing profile 1.

Contraction Coefficient (CCHV) 0.100

Expansion Coefficient (CEHV) 0.300

STATUS: Analyzing cross-section reach 40001.000.

2H6V1455

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

5/09/200

PROJECT NUMBER : 99-33-01

Cross Section Number SECNO	Left Overbank Manning XNL	Channel Manning n XNCH	Right Overbank Manning XNR	Flow Depth DEPTH (ft)	Water Surface Elevation CWSEL (ft MSL)	Critical W. S. Elevation CRIWS (ft MSL)	Known W. S. Elevation WSELK (ft MSL)
Energy Gradient	Left Overbank Length	Channel Length	Right Overbank Length	Energy Gradient Elevation EG (ft MSL)	Weighted Velocity Head HV (ft)	Friction Energy Loss HL (ft)	Other Energy Loss OLOSS (ft)
SLOPE (ft/ft)	XLOBL (ft)	XLCH (ft)	XLOBR (ft)				
Cummul- ative Volume VOL (acre-ft)	Left Overbank Area ALOB (sq ft)	Channel Area ACH (sq ft)	Right Overbank Area AROB (sq ft)	Bridge Deck Area CORAR (sq ft)	Left Bank Elevation LTBNK (ft MSL)	Right Bank Elevation RTBNK (ft MSL)	Number of Balance Trials ITRIAL
Total Flow Q (cfs)	Left Overbank Flow QLOB (cfs)	Channel Flow QCH (cfs)	Right Overbank Flow QROB (cfs)	Computed W. S. Top Width TOPWD (ft)	Left W. S. Station SSTA (ft)	Right W. S. Station ENDST (ft)	Number of Crit Dpth Trials IDC
Travel Time TIME (hrs)	Left Overbank Velocity VLOB (ft/s)	Channel Mean Velocity VCH (ft/s)	Right Overbank Velocity VROB (ft/s)	Length Weighted Manning n WTN	Cummul. Surface Area TWA (acres)	Minimum C. S. Elevation ELMIN (ft MSL)	Number of Other Trials ICONTR
10001.000	0.110	0.040	0.110	3.69	92.69	0.00	92.69
0.015784	0	0	0	93.27	0.58	0.00	0.00
0.00	27	32	220	0.00	90.00	90.00	0
905	63	317	524	168.1	1018.35	1186.40	0
0.00	2.28	9.77	2.38	0.000	0.0	89.00	0

STATUS: Analyzing cross-section reach 40002.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

2H6V1456

STATUS: (3470) Encroachment computation information follows:

Left Encroachment Station (ft, STENCL)	1026.22
Right Encroachment Station (ft, STENCR)	1038.22
Encroachment Method (TYPE)	1
Width or Percent Target	12.000
Left Encroachment Elevation (ft, ELENCCL)	102.00
Right Encroachment Elevation (ft, ELENCR)	102.00

ECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
LOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
OL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
IME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
0002.000	0.000	0.040	0.000	5.61	95.69	95.69	0.00
0.031643	55	65	173	98.50	2.80	2.09	0.67
0.53	0	67	0	0.00	102.00	102.00	20
905	0	905	0	12.0	1026.22	1038.22 -	11
0.00	0.00	13.44	0.00	0.000	0.3	90.08	0

STATUS: Special culvert analysis being performed.

CULVERT DESCRIPTION :

Number of Identical Culverts (CUNO)	2
Culvert Mannings n (CUNV)	0.015
Culvert Entrance Loss Coefficient (ENTLC)	0.300
Box Culvert Height (ft, RISE)	6.00
Box Culvert Opening Width (ft, SPAN)	6.00
Culvert Length (ft, CULVLN)	463.90
Culvert Opening Upstream Invert (ft MSL, ELCHU)	95.19
Culvert Opening Downstream Invert (ft MSL, ELCHD)	90.08
Roadway Length (ft, RDLEN)	20.00
Roadway Weir Flow Discharge Coefficient (COFQ)	2.50
Chart # 8 - box culvert with flared wingwalls, no inlet top edge bevel	
Scale # 1 - wingwalls flared 30 to 75 degrees	

2H6V1457

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

Section 44900, profile 1, conveyance change outside acceptable range.

Section 45000, profile 1, conveyance change outside acceptable range.

Section 45400, profile 1, conveyance change outside acceptable range.

Section 45500, profile 1, conveyance change outside acceptable range.

61 Warning and status message(s) generated

END OF OUTPUT

2H6V1458

Section 42600, profile 1, minimum specific energy.

Section 42800, profile 1, critical depth assumed.

Section 42800, profile 1, minimum specific energy.

Section 42900, profile 1, critical depth assumed.

Section 42900, profile 1, minimum specific energy.

Section 43050, profile 1, critical depth assumed.

Section 43050, profile 1, probable minimum specific energy.

Section 43050, profile 1, 20 trials attempted to balance water surface elevation.

Section 43100, profile 1, conveyance change outside acceptable range.

Section 43200, profile 1, conveyance change outside acceptable range.

Section 43300, profile 1, conveyance change outside acceptable range.

Section 43500, profile 1, conveyance change outside acceptable range.

Section 43600, profile 1, conveyance change outside acceptable range.

Section 43700, profile 1, critical depth assumed.

Section 43700, profile 1, probable minimum specific energy.

Section 43700, profile 1, 20 trials attempted to balance water surface elevation.

Section 43800, profile 1, conveyance change outside acceptable range.

Section 44000, profile 1, conveyance change outside acceptable range.

Section 44100, profile 1, conveyance change outside acceptable range.

Section 44700, profile 1, conveyance change outside acceptable range.

Section 44800, profile 1, critical depth assumed.

Section 44800, profile 1, probable minimum specific energy.

Section 44800, profile 1, 20 trials attempted to balance water surface elevation.

Section 44800, profile 1, slope too steep.

2H6V1459

5/09/2000

ss- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
44500.000	437.00	179.56	0.00	2.33	0.00	133.65	144.2
44600.000	437.00	181.30	0.00	1.74	0.00	78.81	102.6
44700.000	437.00	182.42	0.00	1.13	0.00	126.79	116.3
44800.000	437.00	183.78	0.00	1.35	0.00	89.74	92.4
44900.000	437.00	186.47	0.00	2.69	0.00	160.04	105.0
45000.000	437.00	187.99	0.00	1.53	0.00	87.32	106.9
45100.000	437.00	190.79	0.00	2.80	0.00	76.88	103.9
45200.000	437.00	192.73	0.00	1.94	0.00	78.21	108.2
45300.000	437.00	194.61	0.00	1.89	0.00	95.06	93.5
45400.000	437.00	197.30	0.00	2.69	0.00	62.58	109.7
45500.000	437.00	200.20	0.00	2.90	0.00	64.75	115.3
45600.000	437.00	201.65	0.00	1.45	0.00	72.55	103.5

Summary of Warning and Status Messages :

Section 40002, profile 1, critical depth assumed.
 Section 40002, profile 1, probable minimum specific energy.
 Section 40002, profile 1, 20 trials attempted to balance water surface elevation.
 Section 40003, profile 1, conveyance change outside acceptable range.
 Section 40004, profile 1, conveyance change outside acceptable range.
 Section 40100, profile 1, conveyance change outside acceptable range.
 Section 40200, profile 1, conveyance change outside acceptable range.
 Section 40300, profile 1, conveyance change outside acceptable range.

2H6V1460

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/10

Cross- Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
* 42500.000	488.80	143.19	0.00	1.62	0.00	148.23	127.7
* 42600.000	488.80	145.20	0.00	2.01	0.00	140.58	99.8
42700.000	488.80	146.73	0.00	1.53	0.00	128.03	108.3
* 42800.000	488.80	148.51	0.00	1.78	0.00	110.33	130.9
* 42900.000	488.80	150.16	0.00	1.66	0.00	133.87	116.9
43000.000	488.80	151.77	0.00	1.61	0.00	134.71	108.2
* 43050.000	488.80	153.39	0.00	1.62	0.00	114.45	98.8
* 43100.000	377.96	154.23	0.00	0.83	0.00	110.28	54.3
* 43200.000	377.96	163.55	0.00	9.32	0.00	318.73	100.7
43201.000	437.00	163.94	0.00	0.39	0.00	326.04	35.1
* 43300.000	437.00	163.94	0.00	0.00	0.00	259.03	76.3
43400.000	437.00	163.95	0.00	0.01	0.00	176.24	133.2
43500.000	437.00	163.96	0.00	0.01	0.00	185.40	209.0
* 43600.000	437.00	164.01	0.00	0.05	0.00	146.77	96.4
43700.000	437.00	165.42	0.00	1.41	0.00	60.24	153.4
* 43800.000	437.00	168.59	0.00	3.17	0.00	108.07	126.6
43900.000	437.00	169.68	0.00	1.09	0.00	102.40	124.0
44000.000	437.00	170.96	0.00	1.29	0.00	121.31	113.8
* 44100.000	437.00	172.70	0.00	1.74	0.00	125.08	117.7
44200.000	437.00	173.84	0.00	1.14	0.00	125.49	101.0
44300.000	437.00	175.31	0.00	1.47	0.00	123.42	102.3
44400.000	437.00	177.23	0.00	1.92	0.00	105.26	107.3

2H6V1461

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

Section Number	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	W.S. Elev Diff per Profile (ft) DIFWSP	W.S. Elev Diff per Section (ft) DIFWSX	W.S. Elev Diff per Know/Comp (ft) DIFKWS	Water Surface Top Width (ft) TOPWID	Channel Reach Length (ft) XLCH
SECNO							
* 40300.000	488.80	106.34	0.00	0.09	0.00	138.63	120.4
* 40400.000	488.80	108.00	0.00	1.66	0.00	173.03	107.6
* 40500.000	488.80	109.48	0.00	1.48	0.00	150.29	106.9
40600.000	488.80	110.69	0.00	1.20	0.00	110.76	136.6
40700.000	488.80	112.01	0.00	1.33	0.00	131.60	102.6
40800.000	488.80	113.15	0.00	1.13	0.00	118.87	117.7
* 40900.000	488.80	114.39	0.00	1.24	0.00	118.83	145.7
41000.000	488.80	116.72	0.00	2.33	0.00	148.78	203.1
41100.000	488.80	118.96	0.00	2.24	0.00	93.58	96.1
* 41200.000	488.80	121.35	0.00	2.39	0.00	147.04	128.1
* 41300.000	488.80	122.38	0.00	1.03	0.00	140.66	116.7
* 41400.000	488.80	123.48	0.00	1.10	0.00	128.32	156.9
* 41500.000	488.80	126.35	0.00	2.87	0.00	99.97	125.6
* 41600.000	488.80	128.27	0.00	1.92	0.00	78.90	190.0
41700.000	488.80	130.39	0.00	2.12	0.00	148.30	167.2
* 41800.000	488.80	131.93	0.00	1.54	0.00	186.17	145.1
* 41900.000	488.80	133.59	0.00	1.66	0.00	134.46	182.8
* 42000.000	488.80	135.25	0.00	1.66	0.00	138.18	218.3
* 42100.000	488.80	137.45	0.00	2.19	0.00	129.05	99.5
42200.000	488.80	139.46	0.00	2.01	0.00	138.21	160.3
* 42300.000	488.80	140.82	0.00	1.36	0.00	128.25	162.3
42400.000	488.80	141.58	0.00	0.76	0.00	147.60	110.6

2H6V1462

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/20

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRISW

* 44800.000	92.46	0.00	0.00	182.01	437.00	183.78	183.7
* 44900.000	105.03	0.00	0.00	182.83	437.00	186.47	0.0
* 45000.000	106.98	0.00	0.00	184.60	437.00	187.99	0.0
45100.000	103.99	0.00	0.00	186.30	437.00	190.79	0.0
45200.000	108.28	0.00	0.00	187.80	437.00	192.73	0.0
45300.000	93.52	0.00	0.00	191.00	437.00	194.61	0.0
* 45400.000	109.77	- 0.00	0.00	193.90	437.00	197.30	0.0
* 45500.000	115.38	0.00	0.00	196.50	437.00	200.20	0.0
45600.000	103.58	0.00	0.00	197.70	437.00	201.65	0

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

----- WATERSHED 4 POST-DEVELOPMENT

99-33-01

Cross- Section Number	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	W.S. Elev Diff per Profile (ft)	W.S. Elev Diff per Section (ft)	W.S. Elev Diff per Know/Comp (ft)	Water Surface Top Width (ft)	Channel Reach Length (ft)
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH

40001.000	905.31	92.69	0.00	0.00	0.00	168.05	0.0
* 40002.000	905.31	95.69	0.00	3.00	0.00	12.00	65.8
40003.000	905.31	105.20	0.00	9.50	0.00	12.00	479.1
* 40004.000	905.31	106.19	0.00	0.99	0.00	257.51	29.4
40100.000	488.80	106.22	0.00	0.03	0.00	245.07	80.4
* 40200.000	488.80	106.24	0.00	0.03	0.00	199.80	134.5

2H6V1463

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

Cross- section Number SECNO	Channel Reach Length (ft) XLCH	Top of Roadway Elevation (ft MSL) ELTRD	Max. Low Chord Elevation (ft MSL) ELLC	Minimum C. S. Elevation (ft MSL) ELMIN	Discharge Flow (cfs) Q	Computed W. S. Elevation (ft MSL) CWSEL	Critical W. S. Elevation (ft MSL) CRIWS
<hr/>							
* 42800.000	130.99	0.00	0.00	145.73	488.80	148.51	148.5
* 42900.000	116.96	0.00	0.00	146.73	488.80	150.16	150.1
43000.000	108.27	0.00	0.00	147.31	488.80	151.77	0.0
* 43050.000	98.88	0.00	0.00	149.33	488.80	153.39	153.3
* 43100.000	54.35	0.00	0.00	150.33	377.96	154.23	0.0
* 43200.000	100.79	161.80	0.00	151.83	377.96	163.55	0.0
43201.000	35.54	0.00	0.00	152.33	437.00	163.94	0.0
* 43300.000	76.34	0.00	0.00	153.43	437.00	163.94	0.0
43400.000	133.22	0.00	0.00	155.03	437.00	163.95	0.0
* 43500.000	209.08	0.00	0.00	158.13	437.00	163.96	0.0
* 43600.000	96.45	0.00	0.00	159.63	437.00	164.01	0.0
* 43700.000	153.40	0.00	0.00	162.33	437.00	165.42	165.4
* 43800.000	126.60	0.00	0.00	165.31	437.00	168.59	0.0
43900.000	124.00	0.00	0.00	166.33	437.00	169.68	0.0
* 44000.000	113.83	0.00	0.00	168.13	437.00	170.96	0.0
* 44100.000	117.75	0.00	0.00	169.43	437.00	172.70	0.0
44200.000	101.00	0.00	0.00	170.33	437.00	173.84	0.0
44300.000	102.38	0.00	0.00	172.33	437.00	175.31	0.0
44400.000	107.35	0.00	0.00	174.53	437.00	177.23	0.0
44500.000	144.23	0.00	0.00	176.33	437.00	179.56	0.0
44600.000	102.66	0.00	0.00	177.23	437.00	181.30	0.0
44700.000	116.36	0.00	0.00	180.20	437.00	182.42	0.0

2H6V1464

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/20

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRWS
40600.000	136.61	0.00	0.00	106.99	488.80	110.69	0.
40700.000	102.69	0.00	0.00	107.53	488.80	112.01	0.
40800.000	117.74	0.00	0.00	108.73	488.80	113.15	0.
* 40900.000	145.79	0.00	0.00	110.63	488.80	114.39	0.
41000.000	203.13	0.00	0.00	112.17	488.80	116.72	0.
* 41100.000	96.15	0.00	0.00	115.32	488.80	118.96	0.
* 41200.000	128.14	0.00	0.00	118.13	488.80	121.35	0.
* 41300.000	116.79	0.00	0.00	119.65	488.80	122.38	0.
41400.000	156.97	0.00	0.00	121.33	488.80	123.48	123.4
* 41500.000	125.65	0.00	0.00	122.33	488.80	126.35	126.3
* 41600.000	190.03	0.00	0.00	124.33	488.80	128.27	128.2
41700.000	167.20	0.00	0.00	127.30	488.80	130.39	0.0
41800.000	145.14	0.00	0.00	129.40	488.80	131.93	0.0
* 41900.000	182.87	0.00	0.00	129.50	488.80	133.59	0.0
42000.000	218.34	0.00	0.00	132.20	488.80	135.25	0.0
* 42100.000	99.54	0.00	0.00	134.33	488.80	137.45	137.4
* 42200.000	160.32	0.00	0.00	135.83	488.80	139.46	139.4
42300.000	162.37	0.00	0.00	137.28	488.80	140.82	0.0
* 42400.000	110.63	0.00	0.00	139.13	488.80	141.58	0.0
42500.000	127.74	0.00	0.00	140.63	488.80	143.19	143.1
* 42600.000	99.86	0.00	0.00	142.33	488.80	145.20	145.2
42700.000	108.33	0.00	0.00	143.53	488.80	146.73	146.7

2H6V1465

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

EC	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELH
LOBL	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
OL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
5600.000	0.120	0.040	0.120	3.95	201.65	0.00	0.00
0.013641	118	103	73	201.86	0.21	1.46	0.01
43.17	120	6	30	0.00	198.20	198.20	4
437	312	50	73	72.6	1036.39	1108.94	0
0.96	2.60	8.02	2.38	0.000	18.8	197.70	0

SPECIAL NOTE :

An asterisk (*) to the left of the cross-section number indicates a special note is present in the SUMMARY OF WARNING AND STATUS MESSAGES section.

SUMMARY PRINTOUT TABLE 150 : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

WATERSHED 4 POST-DEVELOPMENT

99-33-01

Cross- Section Number	Channel Reach Length (ft)	Top of Roadway Elevation (ft MSL)	Max. Low Chord Elevation (ft MSL)	Minimum C. S. Elevation (ft MSL)	Discharge Flow (cfs)	Computed W. S. Elevation (ft MSL)	Critical W. S. Elevation (ft MSL)
SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS
40001.000	0.00	0.00	0.00	89.00	905.31	92.69	0.0
40002.000	65.85	0.00	0.00	90.08	905.31	95.69	95.6
40003.000	479.12	130.00	0.00	95.19	905.31	105.20	0.0
40004.000	29.46	0.00	0.00	95.20	905.31	106.19	0.0
40100.000	80.40	0.00	0.00	96.50	488.80	106.22	0.0
40200.000	134.51	0.00	0.00	99.00	488.80	106.24	0.0
40300.000	120.40	0.00	0.00	102.80	488.80	106.34	0.0
40400.000	107.67	0.00	0.00	106.20	488.80	108.00	107.7
40500.000	106.92	0.00	0.00	106.95	488.80	109.48	0.0

2H6V1466

5/09/10

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

45200.000	0.110	0.050	0.110	4.93	192.73	0.00	0.00
0.017486	122	108	90	193.00	0.28	1.94	0.00
41.92	39	7	89	0.00	188.30	188.30	3
437	122	66	248	78.2	1057.77	1135.98	0
0.93	3.06	8.42	2.76	0.000	18.1	187.80	0

STATUS: Analyzing cross-section reach 45300.000.

45300.000	0.110	0.050	0.110	3.61	194.61	0.00	0.00
0.017194	90	93	112	194.78	0.16	1.76	0.01
42.27	81	5	68	0.00	191.50	191.50	2
437	215	39	182	95.1	1021.81	1116.87	0
0.93	2.64	6.79	2.65	0.000	18.3	191.00	0

STATUS: Analyzing cross-section reach 45400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.57

45400.000	0.110	0.050	0.110	3.40	197.30	0.00	0.00
0.052822	85	109	131	197.82	0.52	2.94	0.11
42.57	59	5	30	0.00	194.40	194.40	3
437	237	61	137	62.6	1021.86	1084.44	0
0.94	3.97	11.42	4.59	0.000	18.5	193.90	0

STATUS: Analyzing cross-section reach 45500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.85

45500.000	0.110	0.050	0.110	3.70	200.20	0.00	0.00
0.015487	110	115	78	200.39	0.19	2.53	0.03
42.83	51	5	82	0.00	197.00	197.00	3
437	152	38	245	64.8	1021.28	1086.04	0
0.95	2.99	6.55	2.99	0.000	18.6	196.50	0

STATUS: Analyzing cross-section reach 45600.000.

2H6V1467

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

REACH	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
LOC	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
COL	ALOB	ACH	AROB	CORAE	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
4800.000	0.000	0.110	0.000	1.77	183.78	183.78	0.00
0.189973	107	92	88	184.24	0.46	1.29	0.12
40.36	0	80	0	0.00	183.90	183.90	20
437	0	436	0	89.7	1087.98	1177.72	13
0.89	0.00	5.46	0.00	0.000	17.0	182.01	0

STATUS: Analyzing cross-section reach 44900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 4.93

4900.000	0.110	0.050	0.110	3.64	186.47	0.00	0.00
0.007804	108	105	95	186.53	0.07	2.25	0.04
40.76	155	7	85	0.00	183.50	183.50	8
437	259	34	143	160.0	1043.62	1203.66	0
0.90	1.66	4.54	1.68	0.000	17.3	182.83	0

STATUS: Analyzing cross-section reach 45000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.48

5000.000	0.110	0.050	0.110	3.39	187.99	0.00	0.00
0.033646	149	106	84	188.36	0.37	1.74	0.09
41.28	69	7	42	0.00	185.10	185.10	5
437	216	68	151	87.3	1041.35	1128.67	0
0.91	3.14	9.67	3.54	0.000	17.7	184.60	0

STATUS: Analyzing cross-section reach 45100.000.

5100.000	0.110	0.050	0.110	4.49	190.79	0.00	0.00
0.019507	115	103	96	191.06	0.27	2.69	0.01
41.59	72	7	54	0.00	186.80	186.80	4
437	210	59	166	76.9	1079.00	1155.87	0
0.92	2.92	8.36	3.07	0.000	17.9	186.30	0

STATUS: Analyzing cross-section reach 45200.000.

2H6V1468

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LBNK	RTBNK	ITRIAL
TIME	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

14500.000	0.090	0.063	0.100	3.23	179.56	0.00	0.00
0.016964	113	144	113	179.68	0.12	2.28	0.00
39.20	27	6	135	0.00	177.00	177.00	2
437	84	33	319	133.6	1095.00	1228.65	0
0.86	3.02	4.91	2.36	0.000	16.2	176.33	0

STATUS: Analyzing cross-section reach 44600.000.

44600.000	0.090	0.063	0.100	4.07	181.30	0.00	0.00
0.017308	92	102	112	181.51	0.21	1.80	0.03
39.57	48	8	68	0.00	177.90	177.90	2
437	182	49	205	78.8	1065.13	1143.94	0
0.87	3.73	5.78	2.98	0.000	16.5	177.23	0

STATUS: Analyzing cross-section reach 44700.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.9

44700.000	0.080	0.080	0.080	2.22	182.42	0.00	0.00
0.004661	96	116	145	182.49	0.07	0.96	0.01
40.04	23	168	26	0.00	180.30	180.30	3
437	34	364	37	126.8	1068.64	1195.43	0
0.88	1.46	2.16	1.41	0.000	16.8	180.20	0

STATUS: Analyzing cross-section reach 44800.000.

STATUS: (3235) The computed slope of the energy grade line exceeded 0.10, and critical depth has probably been crossed.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

PROJECT TITLE : FOUR SEASON IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

EC	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
LA	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
OL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
IME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

4000.000	0.100	0.059	0.100	2.83	170.96	0.00	0.00
0.027666	98	113	100	171.13	0.17	1.35	0.03
37.17	55	5	83	0.00	168.80	168.80	1
437	180	36	220	121.3	1034.50	1155.81	0
0.80	3.26	6.12	2.65	0.000	14.8	168.13	0

STATUS: Analyzing cross-section reach 44100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.62

4100.000	0.100	0.059	0.100	3.27	172.70	0.00	0.00
0.010524	100	117	100	172.78	0.08	1.64	0.01
37.57	87	6	105	0.00	170.10	170.10	2
437	184	28	223	125.1	1063.71	1188.78	0
0.81	2.11	4.17	2.11	0.000	15.1	169.43	0

STATUS: Analyzing cross-section reach 44200.000.

4200.000	0.100	0.059	0.100	3.51	173.84	0.00	0.00
0.013322	81	101	116	173.95	0.11	1.16	0.01
38.00	96	7	74	0.00	171.00	171.00	3
437	239	36	161	125.5	1041.03	1166.52	0
0.82	2.48	4.91	2.17	0.000	15.3	170.33	0

STATUS: Analyzing cross-section reach 44300.000.

4300.000	0.100	0.059	0.100	2.98	175.31	0.00	0.00
0.015183	97	102	109	175.42	0.11	1.47	0.00
38.42	73	6	95	0.00	173.00	173.00	3
437	181	29	226	123.4	1042.85	1166.27	0
0.84	2.48	4.71	2.38	0.000	15.6	172.33	0

STATUS: Analyzing cross-section reach 44400.000.

4400.000	0.090	0.063	0.100	2.70	177.23	0.00	0.00
0.023399	104	107	104	177.39	0.16	1.95	0.02
38.80	89	5	44	0.00	175.20	175.20	3
437	273	28	135	105.3	1085.80	1191.06	0
0.85	3.05	5.10	3.07	0.000	15.9	174.53	0

STATUS: Analyzing cross-section reach 44500.000.

2H6V1470

5/09/20

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKNK	RTBNK	ITRIAL
2	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
43700.000	0.100	0.059	0.100	3.09	165.42	165.42	0.00
0.065928	103	153	109	165.97	0.55	1.07	0.15
36.01	50	6	26	0.00	163.00	163.00	20
437	240	64	131	60.2	1077.09	1137.33	14
0.77	4.78	10.03	5.06	0.000	14.1	162.33	0

STATUS: Analyzing cross-section reach 43800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

2

43800.000	0.100	0.059	0.100	3.28	168.59	0.00	0.00
0.013094	104	126	105	168.70	0.11	2.69	0.04
36.32	114	6	52	0.00	165.98	165.98	5
437	263	29	143	108.1	1078.43	1186.50	0
0.78	2.29	4.54	2.72	0.000	14.3	165.31	0

STATUS: Analyzing cross-section reach 43900.000.

43900.000	0.100	0.059	0.100	3.35	169.68	0.00	0.00
0.007878	105	124	102	169.75	0.08	1.05	0.00
36.77	50	6	143	0.00	167.00	167.00	5
437	106	25	305	102.4	1027.28	1129.68	0
0.79	2.11	3.66	2.14	0.000	14.5	166.33	0

STATUS: Analyzing cross-section reach 44000.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)

0.53

2H6V1471

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

ST	SNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLCB	VCH	VROB	WTN	TWA	ELMIN	ICONT

43300.000	0.100	0.059	0.100	10.51	163.94	0.00	0.00
0.000044	69	76	79	163.94	0.00	0.00	0.00
29.72	398	22	883	0.00	154.10	154.10	0
437	140	12	283	259.0	1000.19	1259.21	0
0.64	0.35	0.59	0.32	0.000	12.5	153.43	0

STATUS: Analyzing cross-section reach 43400.000.

43400.000	0.100	0.059	0.100	8.92	163.95	0.00	0.00
0.000088	88	133	122	163.95	0.00	0.01	0.00
32.49	613	18	309	0.00	155.70	155.70	0
437	288	13	134	176.2	1007.00	1183.23	0
0.70	0.47	0.75	0.43	0.000	13.0	155.03	0

STATUS: Analyzing cross-section reach 43500.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.55

43500.000	0.100	0.059	0.100	5.83	163.96	0.00	0.00
0.000293	97	209	104	163.97	0.01	0.02	0.00
34.43	91	12	583	0.00	158.80	158.80	0
437	58	12	366	185.4	1008.72	1194.11	0
0.75	0.63	1.02	0.63	0.000	13.4	158.13	0

STATUS: Analyzing cross-section reach 43600.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.28

43600.000	0.100	0.059	0.100	4.38	164.01	0.00	0.00
0.003623	98	96	97	164.05	0.04	0.07	0.01
35.53	17	9	266	0.00	160.30	160.30	2
437	26	27	382	146.8	1018.35	1165.11	0
0.76	1.50	2.97	1.44	0.000	13.8	159.63	0

STATUS: Analyzing cross-section reach 43700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

2H6V1472

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

CULVERT ANALYSIS RESULTS :

Inlet Control Energy Grade Line Elevation (ft MSL, EGIC)	200.84
Outlet Control Energy Grade Line Elevation (ft MSL, EGOC)	215.59
Water Surface Drop Through Culvert (ft, H4)	9.04
Total Weir Flow (cfs, QWEIR)	231.
Total Culvert Flow (cfs, QCULV)	147.
Mean Channel Velocity (fps, VCH)	0.60
Culvert Opening Area (sq ft, ACULV)	9.6
Top of Roadway Elevation (ft MSL, ELTRD)	161.80
Roadway Weir Length (ft, WEIRLN)	40.0

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
PL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
43200.000	0.100	0.039	0.110	11.72	163.55	0.00	0.00
0.000011	61	100	138	163.55	0.00	9.04	0.00
24.45	427	94	1420	0.00	152.50	152.50	0
377	84	56	236	318.7	1001.17	1319.90	0
0.52	0.20	0.60	0.17	0.000	11.6	151.83	0

STATUS: Analyzing cross-section reach 43201.000.

43201.000	0.100	0.039	0.110	11.61	163.94	0.00	0.00
0.000010	34	35	48	163.94	0.00	0.00	0.00
26.59	645	92	1519	0.00	153.00	153.00	0
437	128	54	253	326.0	1000.16	1326.20	0
0.57	0.20	0.58	0.17	0.000	11.9	152.33	0

STATUS: Analyzing cross-section reach 43300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.49

2H6V1473

CHART DESCRIPTION :

Number of Identical Culverts (CUNO)	1
Culvert Mannings n (CUNV)	0.015
Culvert Entrance Loss Coefficient (ENTLC)	0.800
Pipe Culvert Diameter (ft, RISE)	3.50
Culvert Length (ft, CULVLN)	97.00
Culvert Opening Upstream Invert (ft MSL, ELCHU)	152.00
Culvert Opening Downstream Invert (ft MSL, ELCHD)	149.30
Roadway Length (ft, RDLEN)	40.00
Roadway Weir Flow Discharge Coefficient (COFQ)	2.50

Chart # 3 - concrete pipe culvert, beveled ring entrance

Scale # 1 - (A) SMALL BEVEL = 0.042D

WARNING: (5130) Inlet control energy grade line elevation 200.84 ft MSL
too large if inlet controls.

WARNING: (5135) Outlet control energy grade line elevation 215.59 ft MSL
too large if outlet controls.

STATUS: Analyzing cross-section reach 43200.000.

STATUS: Special culvert outlet control and weir flow.

Energy Gradient Elevation (ft MSL, EG)	163.55
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WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO)	19.80
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2H6V1474

20

5/09/20

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSEL
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTENK	RTENK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
43000.000	0.100	0.039	0.110	4.46	151.77	0.00	0.00
0.009695	94	108	110	151.88	0.11	1.11	0.05
21.12	86	5	136	0.00	147.98	147.98	2
488	190	35	262	134.7	1025.27	1159.97	0
0.39	2.21	6.41	1.93	0.000	10.7	147.31	0

STATUS: Analyzing cross-section reach 43050.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

43050.000	0.100	0.039	0.110	4.06	153.39	153.39	0.00
0.028097	95	98	59	153.99	0.60	1.25	0.15
21.45	86	7	38	0.00	150.00	150.00	
488	247	98	143	114.5	1077.59	1192.05	
0.40	2.87	12.28	3.74	0.000	10.9	149.33	0

STATUS: Analyzing cross-section reach 43100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.95

3100.000	0.100	0.039	0.110	3.90	154.23	0.00	0.00
0.004429	44	54	39	154.50	0.28	0.48	0.03
21.60	110	32	31	0.00	151.00	151.00	2
377	145	189	43	110.3	1067.35	1177.63	0
0.40	1.31	5.81	1.36	0.000	11.1	150.33	0

STATUS: Special culvert analysis being performed.

2H6V1475

290

5/09/2000

EC	XNL	YNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
LOPE	XLOBL	ALCH	XLOBR	EG	HV	HL	OLOSS
OL	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
IME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
2600.000	0.100	0.039	0.110	2.87	145.20	145.20	0.00
0.015153	113	99	85	145.70	0.50	1.61	0.01
19.53	15	23	137	0.00	143.00	143.00	2
488	31	199	257	140.6	1035.15	1175.73	8
0.36	2.07	8.60	1.87	0.000	9.5	142.33	0

STATUS: Analyzing cross-section reach 42700.000.

2700.000	0.100	0.039	0.110	3.20	146.73	0.00	0.00
0.013618	82	108	124	147.30	0.57	1.58	0.02
19.97	62	25	72	0.00	144.30	144.30	2
488	142	224	122	128.0	1032.26	1160.29	0
0.37	2.29	8.65	1.68	0.000	9.9	143.53	0

STATUS: Analyzing cross-section reach 42800.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

300.000	0.100	0.039	0.110	2.78	148.51	148.51	0.00
0.017311	54	130	144	149.08	0.57	1.55	0.00
20.29	113	22	11	0.00	146.40	146.40	2
488	262	203	22	110.3	1064.64	1174.96	15
0.38	2.32	9.02	2.02	0.000	10.1	145.73	0

STATUS: Analyzing cross-section reach 42900.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

400.000	0.100	0.039	0.110	3.43	150.16	150.16	0.00
0.011612	80	116	116	150.73	0.56	1.43	0.00
20.64	71	27	75	0.00	147.40	147.40	3
488	130	235	122	133.9	1022.42	1156.29	11
0.38	1.82	8.49	1.62	0.000	10.4	146.73	0

STATUS: Analyzing cross-section reach 43000.000.

2H6V1476

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2000

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
42300.000	0.100	0.039	0.110	3.54	140.82	0.00	0.00
0.005066	114	162	96	141.06	0.24	0.93	0.04
18.42	32	30	164	0.00	138.00	137.28	2
488	35	185	267	128.3	1126.23	1254.48	0
0.34	1.10	6.12	1.63	0.000	8.7	137.28	0

STATUS: Analyzing cross-section reach 42400.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.55

42400.000	0.100	0.039	0.110	2.45	141.58	0.00	0.00
0.016448	149	110	63	141.75	0.18	0.68	0.01
18.80	22	8	169	0.00	139.80	139.80	2
488	36	65	387	147.6	1042.88	1190.48	0
0.35	1.63	7.30	2.28	0.000	8.9	139.13	0

STATUS: Analyzing cross-section reach 42500.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

42500.000	0.100	0.039	0.110	2.56	143.19	143.19	0.00
0.020245	119	127	79	143.68	0.48	1.69	0.09
19.17	12	18	141	0.00	141.30	141.30	3
488	20	165	302	148.2	1032.47	1180.70	8
0.36	1.62	9.12	2.14	0.000	9.2	140.63	0

STATUS: Analyzing cross-section reach 42600.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

2H6V1477

5/09/2000

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.53

CNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
OPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
L	ALOB	ACH	AROB	CORAR	LTBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
ME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
000.000	0.110	0.059	0.100	3.05	135.25	0.00	0.00
.028149	115	218	97	135.52	0.27	1.77	0.05
17.09	92	18	48	0.00	133.70	133.70	2
488	241	128	119	138.2	1054.58	1192.76	0
0.32	2.62	6.87	2.45	0.000	7.7	132.20	0

STATUS: Analyzing cross-section reach 42100.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

.00.000	0.110	0.039	0.100	3.12	137.45	137.45	0.00
.014467	115	99	99	138.05	0.60	2.06	0.10
48	47	25	85	0.00	135.00	135.00	2
88	68	224	196	129.1	1092.79	1221.84	8
0.33	1.44	8.88	2.30	0.000	8.0	134.33	0

STATUS: Analyzing cross-section reach 42200.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

.00.000	0.110	0.039	0.100	3.63	139.46	139.46	0.00
011230	97	160	116	140.09	0.63	1.72	0.01
17.92	51	29	83	0.00	136.50	136.50	1
488	78	255	155	138.2	1062.70	1200.91	11
0.33	1.51	8.67	1.85	0.000	8.3	135.83	0

STATUS: Analyzing cross-section reach 42300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.49

2H6V1478

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/00

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	CLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKBNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
41600.000	0.120	0.035	0.120	3.94	128.27	128.27	0.00
0.008507	127	190	94	129.21	0.94	1.38	0.02
14.74	25	39	62	0.00	125.00	125.00	3
488	40	358	89	78.9	1025.56	1104.45	8
0.27	1.60	9.03	1.42	0.000	6.1	124.33	0

STATUS: Analyzing cross-section reach 41700.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

41700.000	0.120	0.085	0.120	3.09	130.39	0.00	0.00
0.007877	85	167	149	130.48	0.09	1.19	0.08
15.30	126	65	59	0.00	127.40	127.40	2
488	183	213	91	148.3	1054.67	1202.97	0
0.28	1.45	3.28	1.54	0.000	6.4	127.30	0

STATUS: Analyzing cross-section reach 41800.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.59

41800.000	0.120	0.085	0.120	2.53	131.93	0.00	0.00
0.022257	114	145	122	132.07	0.14	1.58	0.01
15.95	96	27	84	0.00	129.50	129.50	2
488	189	133	165	186.2	1058.59	1244.76	0
0.30	1.97	4.79	1.95	0.000	6.9	129.40	0

STATUS: Analyzing cross-section reach 41900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.69

41900.000	0.110	0.059	0.100	4.09	133.59	0.00	0.00
0.007821	96	182	123	133.70	0.11	1.62	0.00
16.57	25	24	180	0.00	131.00	131.00	3
488	41	108	338	134.5	1046.43	1180.90	0
0.31	1.63	4.38	1.88	0.000	7.3	129.50	0

STATUS: Analyzing cross-section reach 42000.000.

2H6V1479

1300.000	0.120	0.065	0.120	2.73	122.38	0.00	0.00
0.006348	105	116	108	122.43	0.05	0.99	0.00
13.43	51	5	233	0.00	119.98	119.98	4
488	69	16	402	140.7	1056.04	1196.69	0
0.25	1.34	2.98	1.73	0.000	5.3	119.65	0

STATUS: Analyzing cross-section reach 41400.000.

STATUS: (3301) The velocity head difference for current and previous cross-sections exceeded the allowable specified by HVINS.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

1400.000	0.120	0.035	0.120	2.15	123.48	123.48	0.00
024084	89	156	96	124.05	0.57	1.19	0.16
13.94	5	16	137	0.00	122.00	122.00	4
488	7	167	313	128.3	1051.28	1179.60	15
0.25	1.55	9.91	2.29	0.000	5.6	121.33	0

STATUS: Analyzing cross-section reach 41500.000.

WARNING: (3685) 20 trials attempted in balancing assumed water surface elevation (WSEL) and computed water surface elevation (CWSEL).

WARNING: (3693) It is probable that critical depth has been crossed.

WARNING: (3720) Critical depth has been assumed.

1500.000	0.120	0.035	0.120	4.02	126.35	126.35	0.00
0.007753	99	125	104	127.21	0.86	1.45	0.09
1.31	94	40	10	0.00	123.00	123.00	20
488	124	352	11	100.0	1014.57	1114.53	14
0.26	1.32	8.72	1.09	0.000	5.9	122.33	0

STATUS: Analyzing cross-section reach 41600.000.

WARNING: (7185) Critical depth has been crossed, therefore critical depth has been assumed for the current cross-section.

WARNING: (3720) Critical depth has been assumed.

285

2H6V1480

PROJECT TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S

PROJECT NUMBER : 99-33-01

5/09/2007

SECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRIWS	WSELK
SLOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
VOL	ALOB	ACH	AROB	CORAR	LTKNK	RTBNK	ITRIAL
Q	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
TIME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT

40900.000	0.120	0.046	0.120	3.76	114.39	0.00	0.00
0.025033	88	145	120	114.65	0.26	1.35	0.05
11.31	157	7	5	0.00	111.30	111.30	2
488	407	68	12	118.8	1121.18	1240.01	0
0.19	2.58	8.93	2.25	0.000	4.0	110.63	0

STATUS: Analyzing cross-section reach 41000.000.

41000.000	0.120	0.052	0.120	4.55	116.72	0.00	0.00
0.013283	87	203	132	116.79	0.07	2.12	0.02
11.84	4	2	222	0.00	116.00	116.00	2
488	3	6	479	148.8	1093.42	1242.20	0
0.21	0.72	2.85	2.16	0.000	4.3	112.17	0

STATUS: Analyzing cross-section reach 41100.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.6

41100.000	0.120	0.052	0.120	3.64	118.96	0.00	0.00
0.034421	87	96	118	119.19	0.22	2.35	0.05
12.34	10	4	125	0.00	117.10	117.10	2
488	26	33	428	93.6	1053.88	1147.46	0
0.22	2.54	7.49	3.42	0.000	4.6	115.32	0

STATUS: Analyzing cross-section reach 41200.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.56

41200.000	0.120	0.065	0.120	3.22	121.35	0.00	0.00
0.014158	110	128	103	121.43	0.09	2.23	0.01
12.78	66	6	155	0.00	118.50	118.50	3
488	143	32	312	147.0	1061.11	1208.15	0
0.23	2.17	4.90	2.01	0.000	4.9	118.13	0

STATUS: Analyzing cross-section reach 41300.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 1.49

2H6V1481

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 2.27

ECNO	XNL	XNCH	XNR	DEPTH	CWSEL	CRWS	WSELK
LOPE	XLOBL	XLCH	XLOBR	EG	HV	HL	OLOSS
DL	ALOB	ACH	AROB	CORAR	LITBNK	RTBNK	ITRIAL
	QLOB	QCH	QROB	TOPWD	SSTA	ENDST	IDC
IME	VLOB	VCH	VROB	WTN	TWA	ELMIN	ICONT
0500.000	0.110	0.090	0.110	2.53	109.48	0.00	0.00
0.008927	126	106	42	109.57	0.09	1.37	0.01
9.47	17	96	113	0.00	107.00	107.00	3
488	28	279	180	150.3	1017.53	1167.82	0
0.15	1.67	2.90	1.59	0.000	2.9	106.95	0

STATUS: Analyzing cross-section reach 40600.000.

0600.000	0.110	0.090	0.110	3.70	110.69	0.00	0.00
0.012368	101	136	111	110.80	0.11	1.22	0.01
10.02	158	22	15	0.00	107.65	107.65	4
488	360	93	34	110.8	1037.99	1148.75	0
0.17	2.28	4.13	2.18	0.000	3.2	106.99	0

STATUS: Analyzing cross-section reach 40700.000.

0700.000	0.120	0.046	0.120	4.48	112.01	0.00	0.00
0.015711	101	102	100	112.25	0.24	1.41	0.04
10.48	98	9	83	0.00	108.20	108.20	2
488	213	79	195	131.6	1065.19	1196.80	0
0.18	2.16	8.23	2.35	0.000	3.5	107.53	0

STATUS: Analyzing cross-section reach 40800.000.

800.000	0.120	0.046	0.120	4.42	113.15	0.00	0.00
0.008855	69	117	114	113.26	0.11	0.99	0.01
10.88	217	9	10	0.00	109.40	109.40	2
488	416	53	19	118.9	1062.76	1181.63	0
0.19	1.92	5.91	1.79	0.000	3.7	108.73	0

STATUS: Analyzing cross-section reach 40900.000.

WARNING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 0.59

HEC-2 Analysis version 4.0
 TITLE : FOUR SEASONS IN HIST. VA. - FLOODPLAIN S
 NUMBER : 99-33-01

PAGE 5 PAGE 6
 5/09/2000 09/200

ING: (5130) Inlet control energy grade line elevation 106.10 ft MSL
 too large if inlet controls.

JS: Analyzing cross-section reach 40003.000.

INVERT INLET CONTROL RESULTS :

Grade Line Elevation for Inlet Control (ft MSL, EGIC)	106.10
Grade Line Elevation for Outlet Control (ft MSL, EGOC)	104.45
s Computed Water Surface Elevation (ft MSL, PCWSE)	95.69
Roadway Elevation (ft MSL, ELTRD)	130.00

1063.00
 1075.00
 1
 12.000
 130.00
 130.00

ELK
 OSS
 RIAL
 C
 DNT

JS: (3280) For cross-section 40003.00, ends have been extended
 vertically 3.20 feet in order to calculate the hydraulic
 cross-section properties.

0.00
 0.00
 3
 0
 0

US: (3301) The velocity head difference for current and previous
 cross-sections exceeded the allowable specified by HVINS.

ING: (3302) Conveyance change is outside of acceptable range.

Upstream to Downstream Conveyance Ratio (KRATIO) 3.47

IS

ALYSIS RESULTS :

ontrol Energy Grade Line Elevation (ft MSL, EGIC)	106.10
Control Energy Grade Line Elevation (ft MSL, EGOC)	104.45
urface Drop Through Culvert (ft, H4)	7.61
eir Flow (cfs, QWEIR)	0.
Culvert Flow (cfs, QCULV)	905.
annel Velocity (fps, VCH)	7.64
Opening Area (sq ft, ACULV)	72.0
Roadway Elevation (ft MSL, ELTRD)	130.00
Weir Length (ft, WEIRLN)	0.0

3.81
 0.00
 0.09
 2
 0
 0
 0.100
 0.300

0.63

2H6V1483

280

20

SECTION VI
CORRESPONDENCE

2H6V1484

PROJECT: FOUR SEASONS IN HISTORIC VA.
 TASK: FLOODPLAIN STUDY
 ENGINEER: TIM EVERLY
 DATE: JAN. 21, 2000

ROUGHNESS COEFFICIENT COMPUTATIONS

PICTURE	DESCRIPTION OF REACH	BASIC "n"	SURFACE IRREG.	X-SECTION VARIANCE	OBSTRUCTIONS	VEGETATION	MEANDERING	"n" LEFT OVERBANK	"n" CHANNEL	"n" RIGHT OVERBANK
1-1	DOUBLE BOX CHANNEL							0.015		
1-3 L	LEFT OVERBANK MILD SLOPE HIGH VEGETATION	0.02	0	0	0	0.09		0.11		
1-3 C	2'W x 6"H CHANNEL W/ MILDLY ROLLING OVERBANKS WITHIN LARGE FLOODPLAIN	0.02	0.005	0.005	0	0	1	0.030		
1-3 R	RIGHT OVERBANK MEDIUM SLOPE HIGH VEGETATION	0.02	0	0	0	0.09				0.11
1-4 L	LEFT OVERBANK MILD SLOPE MEDIUM VEGETATION	0.02	0	0	0	0.08		0.1		
1-4 C	2'W x 6"H CHANNEL W/ MILDLY ROLLING OVERBANKS WITHIN LARGE FLOODPLAIN	0.02	0.005	0	0.01	0	1.3	0.046		
1-4 R	RIGHT OVERBANK VARIED, MODERATE SLOPE SOME VEGETATION	0.02	0	0	0	0.08				0.1
1-5 L	LEFT OVERBANK MILD SLOPE HIGH VEGETATION	0.02	0.01	0	0	0.08		0.11		
1-5 C	WIDE, SHALLOW AND NEARLY UNDEFINED CHANNEL (APPROX. 8'W x 2"H)	0.02	0	0	0.05	0.01	1	0.080		
1-5 R	RIGHT OVERBANK	0.02	0.005	0	0	0.08				0.11

2H6V1485



COUNTY OF PRINCE WILLIAM

4379 Ridgewood Center Drive, Prince William, Virginia 22192-5308
(703) 792-6820 Metro 631-1703 FAX (703) 792-6828

DEPARTMENT OF
PUBLIC WORKS

Robert W. Wilson
Director

April 11, 2000

Mr. Christopher J. Lupia, P.E.
Christopher Consultants, Ltd.
9900 Main Street
Suite 400
Fairfax, VA 22031-3907

RE: Four Seasons in Historic Virginia - Floodplain Study
Manning's Roughness Coefficient "n"

Dear Mr. Lupia:

The proposed 'n' values for the referenced project are acceptable for the County to use in the floodplain study. Table showing the 'n' values and this letter shall be included with the report and the plan(s).

Should you have any questions, please contact me at 703 792-7070.

Sincerely,

Oscar F. Guzman, Chief
Watershed Management Branch

OFG/rpb/fourseasons nfactor.doc

2H6V1486

GRADUAL SLOPE HIGH VEGETATION								
1-6 C	UNDEFINED CHANNEL LEVEL PLAIN SOME VEGETATION	0.02	0.005	0	0	0.065	1	0.090
1-7 L	LEFT OVBANK GRADUAL SLOPE NEGLEGIBLE VEGETATION	0.02	0	0	0	0.1		0.12
1-7 C	2"Wx8" MEANDERING EARTH CHANNEL, VARIED X-SEC. AND OVBANKS	0.02	0.005	0.01	0	0	1.3	0.046
1-7 R	RIGHT OVBANK GRADUAL SLOPE NEGLEGIBLE VEGETATION	0.02	0	0	0	0.1		0.12
1-8 L	LEFT OVBANK GRADUAL SLOPE NEGLEGIBLE VEGETATION	0.02	0	0	0	0.1		0.12
1-8 C	2"Wx4" MEANDERING EARTH CHANNEL PAST CHANNEL DIVIDE,	0.02	0.005	0.005	0	0.01	1.3	0.052
1-8 R	GRADUAL SLOPE NEGLEGIBLE VEGETATION	0.02	0	0	0	0.1		0.12
1-9 L	LEFT OVBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0	0	0	0.1		0.12
1-9 C	MEANDERING, SHALLOW EARTH AND STONE CHANNEL	0.02	0.005	0.01	0.015	0	1.3	0.065
1-9 R	RIGHT OVBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0	0	0	0.1		0.12
1-10 L	LEFT OVBANK NO SLOPE NEGLEGIBLE VEGETATION	0.02	0	0	0	0.1		0.12
1-10 C	WIDE, SHALLOW CHANNEL (APROX. 10"Wx8"H), CLAY AND SOIL BOTTOM	0.02	0.005	0.005	0	0	1.15	0.035
1-10 R	RIGHT OVBANK GRADUAL SLOPE NEGLEGIBLE VEGETATION	0.02	0	0	0	0.1		0.12
1-12	30" CULVERT SEVERE INLET OBSTRUCTIONS						*.015	

2H6V1487

1-14 C	UNDEFINED CHANNEL LEVEL PLAIN HIGH VEGETATION	0.02	0.005	0	0	0.06	1	0.085
1-15 L	LEFT OVBANK GRADUAL SLOPE SOME VEGETATION	0.02	0.005	0	0	0.07		0.1
1-15 C	6'Wx18" MEANDERING EARTH CHANNEL, VARIED X-SEC. AND OVBANKS	0.02	0.01	0.005	0.01	0	1.3	0.059
1-15 R	RIGHT OVBANK VARIED X-SECTION SOME VEGETATION	0.02	0.01	0.01	0	0.07		0.11
1-16 L	LEFT OVBANK HIGH VEGETATION LEVEL PLAIN	0.02	0.005	0	0	0.08		0.11
1-16 C	WIDE, SHALLOW CHANNEL, W/ VARIED X-SECTIONAL WIDTH, CLAY AND SOIL BOTTOM	0.02	0.005	0.005	0	0	1.3	0.039
1-16 R	RIGHT OVBANK HIGH VEGETATION LEVEL PLAIN	0.02	0.005	0	0	0.07		0.1
1-18 L	LEFT OVBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0	0	0	0.08		0.1
1-18 C	2'Wx8"H MEANDERING EARTH CHANNEL W/ SEVERE OBSTRUCTIONS	0.02	0.005	0.005	0.01	0.005	1.3	0.059
1-18 R	RIGHT OVBANK LEVEL PLAIN SOME VEGETATION	0.02	0	0	0	0.08		0.1
1-19 L	LEFT OVBANK MOSSY VEGETATION LEVEL PLAIN	0.02	0	0	0	0.08		0.1
1-19 C	3'Wx12"H EARTH CHANNEL	0.02	0.005	0.005	0	0	1.15	0.035
1-19 R	RIGHT OVBANK MOSSY VEGETATION LEVEL PLAIN	0.02	0	0	0	0.08		0.1
1-20 L	LEFT OVBANK LEVEL PLAIN HIGH VEGETATION	0.02	0.005	0	0.01	0.06		0.1

2H6V1488

1-20 C	NARROW, SPORATICLY DEFINED CHANNEL WITHIN LEVEL HIGHLY VEGETATED AREA	0.02	0	0	0.01	0.025	1.15	0.053
1-20 R	RIGHT OVERBANK LEVEL PLAIN HIGH VEGETATION	0.02	0.005	0	0	0.06		0.09
1-22	HIGHLY VEGETATED, UNDEFINED CHANNEL WITHIN LARGE LEVEL PLAIN	0.02	0	0	0	0.06	1	0.080
	VERY HIGHLY VEGETATED UPSTREAM	0.02	0	0	0	0.09	1	0.110
1-23 L	LEFT OVERBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0	0	0	0.09		0.11
1-23 C	EARTH CHANNEL W/ VARIOUS X-SEC AND SIGNIFICANT OBSTRUCTIONS	0.02	0	0.01	0.01	0.01	1	0.050
1-23 R	RIGHT OVERBANK LEVEL PLAIN MOSSY VEGETATION	0.02	0	0	0	0.09		0.11
1-24 L	LEFT OVERBANK MOSSY VEGETATION GRADUAL SLOPE	0.02	0.005	0	0	0.09		0.12
1-24 C	SPORATICLY DEFINED MOSSY CHANNEL W/ VARIOUS X-SEC	0.02	0.005	0.01	0	0	1.15	0.040
1-24 R	RIGHT OVERBANK MOSSY VEGETATION GRADUAL SLOPE	0.02	0.005	0	0	0.09		0.12
1-2 L	LEFT OVERBANK GRADUAL SLOPE SOME VEGETATION	0.02	0.005	0.005	0	0.08		0.11
1-2 C	3'Wx12'H ROCK CHANNEL W/ SEVERE SURFACE IRREG.	0.025	0.005	0.005	0	0	1	0.035
1-2 R	RIGHT OVERBANK SHARP SLOPE SOME VEGETATION	0.02	0.01	0.005	0	0.08		0.12
2-4 L	LEFT OVERBANK APPRECIABLE VEGETATION GRADUAL SLOPE	0.02	0.005	0.005	0	0.08		0.11

2H6V1489

2-4 C	STONE CHANNEL DIVIDE (18"Wx12"H), SOME VEG. & SURFACE IRREG.	0.02	0.005	0.005	0	0.005	1.15	0.040
2-4 R	RIGHT OVERBANK APPRECIABLE VEGETATION SHARP SLOPE	0.02	0.005	0.005	0	0.08		0.11
2-5	30" CULVERT RUNNING ACROSS I-95 AND INTO THE SITE						*.015	
2-6 L	LEFT OVERBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0	0	0	0.08		0.1
2-6 C	2'Wx1'H EARTH CHANNEL SEVERE MEANDERING MINOR VARIATION IN X-SEC	0.02	0.01	0.005	0	0	1.3	0.046
2-6 R	RIGHT OVERBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0	0	0	0.08		0.1
2-7 L	LEFT OVERBANK MODERATE SLOPE MOSSY VEGETATION	0.02	0.01	0.005	0	0.08		0.12
2-7 C	4'Wx8"H MEANDERING, EARTH CHANNEL SEVERE OBSTRUCTIONS	0.02	0.01	0.005	0	0.005	1.3	0.052
2-7 R	RIGHT OVERBANK GRADUAL SLOPE MOSSY VEGETATION	0.02	0.005	0	0	0.08		0.11
2-8 L	LEFT OVERBANK GRADUAL SLOPE HIGH VEGETATION	0.02	0	0	0	0.09		0.11
2-8 C	NARROW, SHALLOW (6"x6") CHANNEL W/ NUMEROUS OBSTRUCTIONS	0.02	0.005	0	0.01	0	1.3	0.046
2-8 R	RIGHT OVERBANK GRADUAL SLOPE HIGH VEGETATION	0.02	0	0.005	0	0.09		0.12
2-9 L	LEFT OVERBANK	0.02	0	0	0	0.08		0.1
2-9 C	NARROW EARTH CHANNEL (8"Wx8"H) W/ MINOR OBSTRUCTIONS	0.02	0.005	0.005	0	0.005	1.15	0.040
2-9 R	RIGHT OVERBANK	0.02	0	0	0	0.08		0.1

2H6V1490

2-10	L	LEFT OVBANK	0.02	0.005	0	0	0.09	0.12
2-11		LEVEL PLAIN						
2-12		HIGH VEGETATION						
	C	SERIES OF BEAVER DAMS VARIED X-SEC, HIGH VEG. DOWNSTREAM OF DAMS	0.02	0.01	0.015	0	0.01 1.15	0.063
	R	RIGHT OVBANK LEVEL PLAIN HIGH VEGETATION	0.02	0.005	0	0	0.09	0.12
2-18	L	LEFT OVBANK LEVEL PLAIN MODERATE VEGETATION	0.02	0.005	0.005	0	0.08	0.11
	C	STONE CHANNEL OPENING TO POWELL'S CREEK APPROX. 4'Wx3'H	0.02	0.005	0.015	0	0 1.15	0.046
	R	RIGHT OVBANK LEVEL PLAIN MODERATE VEGETATION	0.02	0.005	0.005	0	0.08	0.11
2-21	L	LEFT OVBANK MOSSY VEGETATION LEVEL PLAIN	0.02	0.005	0.005	0.01	0.08	0.12
	C	STONE CHANNEL W/ WIDELY VARING X-SEC & HAVING A MAJOR TREE OBSTRUCTION	0.025	0	0.01	0.02	0 1.15	0.063
	R	RIGHT OVBANK MOSSY VEGETATION GRADUAL PLAIN	0.02	0.005	0.005	0.01	0.08	0.12
2-22	L	LEFT OVBANK MOSSY VEGETATION LEVEL PLAIN	0.02	0.005	0	0	0.08	0.11
	C	2'Wx6"H MEANDERING EARTH CHANNEL	0.02	0	0.005	0	0.005 1.3	0.039
	R	RIGHT OVBANK MOSSY VEGETATION LEVEL PLAIN	0.02	0.005	0	0.01	0.08	0.12
2-23	L	LEFT OVBANK LEAFY AND MOSSY VEG. GRADUAL SLOPES	0.02	0	0	0	0.09	0.11
	C	NARROW SHALLOW EARTH CHANNEL	0.02	0	0.005	0.01	0 1	0.035

2H6V1491

R	RIGHT OVERBANK LEAFY AND MOSSY VEG. GRADUAL SLOPES	0.02	0	0.005	0.01	0.09		0.13
2-24 L	LEFT OVERBANK	0.02	0	0.005	0	0.08		0.11
2-25	LEAFY AND MOSSY VEG.							
3-1	ROLLING SLOPES							
C	NARROW, SHALLOW EARTH CHANNEL	0.02	0	0.005	0	0.005	1.15	0.035
R	RIGHT OVERBANK LEAFY AND MOSSY VEG. ROLLING SLOPES	0.02	0	0.005	0	0.08		0.11
3-2	EARTH CHANNEL DIVIDES INTO SEVERAL STREAMS WITHIN LARGE LEVEL PLAIN							
3-3	STANDING WATER							
3-4	WITHIN LARGE, NEARLY SATURATED PLAIN							
	PLAIN AREA COVERED PICTURES 3-2,3-3,3-4	0.02	0.005	0	0	0.08		0.105
3-5 L	LEFT OVERBANK	0.02	0	0.005	0	0.08		0.11
3-6	GRADUAL SLOPE MODERATE VEGETATION							
C	APPROX. 8'Wx2.5'H EARTH CHANNEL WITH SOME MEANDERING & OBSTRUCTIONS	0.02	0.005	0.01	0	0	1.15	0.040
R	RIGHT OVERBANK GRADUAL SLOPE MODERATE VEGETATION	0.02	0.005	0	0	0.08		0.11
3-7 L	LEFT OVERBANK BRUSHY VEGETATION GRADUAL SLOPE	0.02	0.005	0.01	0	0.1		0.14
C	EARTH CHANNEL WITHIN HIGHLY VEGETATED AREA	0.02	0.01	0.005	0	0.01	1.15	0.052
R	RIGHT OVERBANK BRUSHY VEGETATION GRADUAL SLOPE	0.02	0.01	0.01	0	0.1		0.14

2H6V1492

3-8	L	LEFT OVBANK VERY HIGH VEGETATION GRADUAL SLOPE	0.02	0.005	0	0	0.06		0.09
	C	LARGE BEAVER DAM 15'W @OUTLET	0.02	0.01	0.005	0	0	1	0.035
	R	RIGHT OVBANK VERY HIGH VEGETATION LEVEL PLAIN	0.02	0.005	0	0	0.06		0.09
3-9	L	LEFT OVBANK MODERATE VEGETATION GRADUAL SLOPE	0.02	0.005	0.005	0	0.08		0.11
	C	2'Wx4'H EARTH CHANNEL	0.02	0	0.01	0	0	1.15	0.035
	R	RIGHT OVBANK MODERATE VEGETATION GRADUAL SLOPE	0.02	0.005	0.005	0	0.08		0.11
3-10	L	LEFT OVBANK GRADUAL SLOPE	0.02	0	0	0	0.08		0.1
3-11		MODERATE VEGETATION							
3-12		SERIES OF BEAVER DAMS							
3-13	C	VARIING CHANNEL X-SEC SOME VEGETATION	0.02	0.01	0.015	0	0	1.15	0.052
	R	RIGHT OVBANK GRADUAL SLOPE MODERATE VEGETATION	0.02	0	0	0	0.08		0.1
3-14	L	LEFT OVBANK GRADUAL SLOPE	0.02	0	0	0.01	0.1		0.13
3-15		MODERATE VEGETATION							
3-16		SERIES OF BEAVER DAMS							
3-19	C	SOME VEGETATION	0.02	0.01	0.01	0	0.01	1.15	0.058
	R	RIGHT OVBANK LEVEL PLAIN HIGH VEGETATION	0.02	0	0	0.01	0.1		0.13
3-20	C	48"?? DOUBLE BOX CHANNEL DRAINING OFFSITE UNDER I-95						*.015	
3-21	L	LEFT OVBANK MOSSY VEGETATION	0.02	0	0	0	0.09		0.11
3-22		GRADUAL SLOPE							
3-23	C	10'Wx12'H EARTH & STONE	0.025	0.005	0.01	0	0	1	0.040

2H6V1493

	CHANNEL							
R	RIGHT OVERBANK SOME VEGETATION LEVEL PLAIN	0.02	0	0	0	0.09		0.11

2H6V1494



SMALL WHORLED POGONIA

(ISOTRIA MEDEOLOIDES)

HABITAT EVALUATION AND SEARCH REPORT

DUMFRIES ROAD AT TALON DRIVE
PRINCE WILLIAM COUNTY, VIRGINIA

Prepared For:

Mike Ogden
Zimmer Development Company, LLC
111 Princess Street
Wilmington, North Carolina 28402

WSSI Project No. 10435

August 12, 2004

2H6V1495

Small Whorled Pogonia Habitat Evaluation and Search
DUMFRIES ROAD AT TALON DRIVE
Prince William County, Virginia
August 12, 2004

Executive Summary

Wetland Studies and Solutions, Inc. (WSSI) has conducted a habitat evaluation and search for the small whorled pogonia (*Isotria medeoloides*) on the Dumfries Road at Talon Drive site in Prince William County, Virginia. This report addresses the Federal Endangered Species Act general condition for the purposes of Clean Water Act permitting. This report discusses the distribution and habitat associations of the small whorled pogonia, details the methodology of our habitat evaluation and search, and presents our findings and conclusions.

Although "high-quality" and "medium-quality" habitat for this species is present on the site, no small whorled pogonias were found during this search.

General Distribution and Habitat Associations of the Small Whorled Pogonia

The small whorled pogonia has been recorded in at least 21 eastern states, and in Ontario, Canada. Despite the relatively widespread occurrence of this species, it is sparsely dispersed, and most extant sites are represented by few individuals. Due to its rarity, this species was listed as endangered on the federal level in 1982 (U.S. Fish and Wildlife Service, 1982). Increased efforts to locate this species following its listing led to the discovery of a number of additional sites, increasing the number of known extant sites from 34 in 1985 to 104 (in 15 states) in 1993. In 1993, known sites occupied by the small whorled pogonia numbered 66 in New England, 18 in the southern Appalachians, 13 in the Piedmont and Coastal Plain of Virginia, Delaware, and New Jersey, and seven in other scattered locations (U.S. Fish and Wildlife Service, 1993). The small whorled pogonia was downlisted to threatened status on the federal level in 1994 (U.S. Fish and Wildlife Service, 1994).

Due to the apparent rarity of the small whorled pogonia in Virginia, this species was listed as state-endangered in 1985 (Terwilliger 1991). In 1991, extant colonies were known only from Caroline, Gloucester, James City, Stafford, and Prince William counties. Increased survey effort in the last decade has led to the discovery of additional colonies, including some in new areas such as Spotsylvania and Madison counties. Nevertheless, in areas where the small whorled pogonia is currently known to exist, it occurs only in a few colonies represented by small numbers of individuals (Ware 1991). As of May 2004, the small whorled pogonia had been recorded in fourteen counties (plus the City of Williamsburg) in Virginia. In Virginia, most known colonies occur in the Piedmont and Coastal Plain regions (Harvill *et al.* 1992); with single additional colonies known from the Big Stone Gap area straddling the Lee/Wise County line in the southwestern part of the state and from Shenandoah National Park in Madison County (C. Ludwig and D.M.E. Ware, pers. comm.).

Most known colonies of the small whorled pogonia in Prince William County occur on the Quantico Marine Corps Base and in Prince William Forest Park, in the southeastern part of the county (C. Ludwig and D.M.E. Ware, pers. comm.). Prior to the search of the site, WSSI was aware of the locations of at least five additional colonies in Prince William County.

The small whorled pogonia has been recorded in a variety of forest types (U.S. Fish and Wildlife Service 1992). As a result, the factors limiting the distribution and abundance of this species, in particular its rarity and sparse distribution throughout its fairly broad range, are not well understood. However, several characteristics are common to most occupied sites, enabling the summary of general habitat associations of the species. Most occupied sites occur in third-growth upland hardwood forest, usually dominated by oaks (*Quercus* spp.) approximately 40 to 80 years old (Ware 1995). Tree canopy species often present at occupied sites in Virginia include white oak (*Quercus alba*), American beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), and hickories (*Carya* spp.), with black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and/or northern red oak (*Quercus rubra*) occasionally present in large numbers as well (Ware 1995)¹.

Most occupied sites have a relatively open understory and sparse herbaceous ground cover. According to Ware (1995), understory shrubs and trees with which the small whorled pogonia is often found include flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), red maple (*Acer rubrum*), and sometimes mountain laurel (*Kalmia latifolia*). Herbaceous associates most commonly occurring with the small whorled pogonia in Virginia include striped wintergreen (*Chimaphila maculata*), partridge berry (*Mitchella repens*), sassafras (*Sassafras albidum*) seedlings, naked-flowered tick-trefoil (*Desmodium nudiflorum*), Indian cucumber root (*Medeola virginiana*), lowbush blueberry (*Vaccinium pallidum*), American strawberry bush (*Euonymus americanus*), Solomon's seal (*Polygonatum biflorum*), false Solomon's seal (*Maianthemum racemosum*), Virginia creeper (*Parthenocissus quinquefolia*), catbrier (*Smilax glauca*), and the common whorled pogonia (*Isotria verticillata*). Occasionally it is found with New York fern (*Thelypteris noveboracensis*) and Christmas fern (*Polystichum acrostichoides*) as well (Ware, 1995).

Although the small whorled pogonia occasionally occurs on slopes that are steep or that face the south, southeast, or northwest, it is generally found on gentle to moderate slopes with northern or eastern exposure (Ware, 1987a; 1991). This species usually occurs where the forest floor is amply flecked with sunlight, and it is often found near small forest openings (Mehrhoff, 1989).

The common soil factor at most small whorled pogonia sites is the "highly-acidic (pH is between 4.3 and 5.5), nutrient-poor quality of the soil, particularly sandy loams" (Mehrhoff, 1989; Rawinski, 1986). Although there are several reports elsewhere of small whorled pogonias from calcareous or nutrient-rich soils (Correll, 1950; Steyermark, 1963), no small whorled pogonia populations in rich soils are known from Virginia (Ware, 1987a). Soil moisture levels in "high quality" habitat are generally moist to slightly dry (Ware, 1987a). Ware (1994) reports a Stafford County small whorled pogonia site where the soils are described as being a clay or silt loam of the Nason-Elioak-Manor soil association in an area with alternating bands of sedimentary rock (e.g., shale, siltstone) and igneous intrusive and thermally-metamorphosed rock (e.g., basalt and diabase). Therefore, areas with predominantly silt loam soils in areas of known highly differentiated geology cannot be completely excluded from searches for small whorled pogonia on the basis of soil parameters alone.

¹ Nomenclature used in this Report follows *A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands* (July, 1998) Biota of North America Project interactive website URL at: <http://www.csd.tamu.edu/FLORA/b98/check98.htm>

Other environmental factors associated with the occurrence of the small whorled pogonia include the presence of standing dead trunks, decaying woody debris, the presence of leaf litter, and the presence of a fragipan or other impermeable layer beneath the surface (U.S. Fish and Wildlife Service, 1993; Ware 1987a; 1991; 1995).

Dumfries Road at Talon Drive Site Description

The Dumfries Road at Talon Drive site is located on the northeast side of Dumfries Road (Rt. 234), north of its intersection with Van Buren Road and Old Stage Road in eastern Prince William County, Virginia. Exhibit 1 is a vicinity map that depicts the approximate location of the study area.

The southern and western portions of the site, which border Dumfries Road and Old Stage Road are relatively flat or gently sloping. These areas are generally occupied by single family homes and businesses along with accompanying lawns, gardens, parking lots and other areas devoid of natural vegetation, although mixed pine-hardwood forest communities and old-field communities are also present. Mixed hardwood forest and pine-hardwood forest occur on the more steeply sloped drainageways in the northern, central and eastern portions of the site as well as along the unnamed tributary of Quantico Creek that crosses the northeastern portion of the site. The topography of the study area is depicted on the USGS Topographic Map in Exhibit 2, as well as in the background topo in Attachment I. General vegetative cover can be seen in the Spring 2004 color infrared aerial photograph in Exhibit 3 and as the background photograph in Attachment I.

Dumfries Road at Talon Drive Soils

The soils on the site are mapped as Dumfries sandy loam, Hatboro-Cordorus complex, and Quantico sandy loam (Exhibit 4). Based on the Prince William County Soil Survey (Elder, 1989), the Dumfries sandy loam and Quantico sandy loam soils, located in the northern, central and southern part of the site, are expected to provide "high-quality" conditions for the small whorled pogonia, as they are sandy loams, very strongly to strongly acid (pH = 4.3 to 5.5), and have low nutrient content. The Hatboro-Cordorus soils, located in the northeastern part of the site, have low to moderate nutrient content, are strongly acidic to neutral and are not sandy. As noted above, the small whorled pogonia has been recorded by Ware (1994) from non-sandy soils in Stafford County, and therefore, the presence of small whorled pogonias in areas where Hatboro-Codorus complex soils are mapped can not be entirely discounted due to the absence of sandy loam soils in these areas.

Habitat Evaluation & Search Methodology

The habitat evaluation and search for individual small whorled pogonias were conducted on July 9 and 10, 2004 by William S. Sipple². In conjunction with performing the field work at the site, Mr. Sipple visited a known small whorled pogonia colony at another site in eastern Prince William County to observe small whorled pogonias and their habitat to

² William S. Sipple is included on the U.S. Fish and Wildlife Service's current list of small whorled pogonia survey contacts.

ensure familiarity with the visual appearance and seasonal conditions for a local Prince William County small whorled pogonia population. Variables reviewed included the visual distinctions between it and similar vegetation, and the general habitat associations of small whorled pogonias (including the herbaceous plant associates) at this colony. The timing of this survey was selected to coincide with the period when the stems and leaves of the small whorled pogonia are most likely to be visible. Based on the literature consulted (*e.g.*, U.S. Fish and Wildlife Service, 1992) and seasonal observations of small whorled pogonias at a nearby colony, the date of our site survey was appropriately timed for observing the small whorled pogonia if present on the site³.

Before beginning intensive searches for individual small whorled pogonias on the site, WSSI conducted a field evaluation of habitat suitability throughout the site using scaled (1 inch = 100 feet) topographic mapping. This was accomplished by initially assessing the entire site's vegetation and soil variability through sampling and qualitative data compilation. During the habitat transecting evaluation, the investigator looked casually for small whorled pogonias. The compiled field data were then compared with mapping, and the approximate boundaries of forested habitat that appeared to be suitable for small whorled pogonia habitat searches were established. The preliminary boundaries were field mapped, and thereafter, refined with better precision using landmarks, pacing and slope distance estimates. Using this method, "low-quality" habitat (*e.g.*, open areas such as lawns, gardens and early successional old-field communities) was identified. Similarly, "high-quality" habitat could be accurately evaluated as being initially present or absent. The preliminary habitat evaluation indicated that approximately one-fifth of the site supports "high-quality" habitat.

Subsequently, the initially developed field maps were refined further by taking into account observed smaller scale variations in vegetative composition and pertinent small whorled pogonia life history variables. Transects were walked through each area to determine whether the quality of the habitat investigated warranted an intensive small whorled pogonia search. Overall habitat quality was determined on the basis of the maturity level (age class and size) and species composition of the canopy trees, the relative density and species composition of understory trees and shrubs, the density and species composition of the herbaceous cover including woody seedlings, slope aspect and steepness, relative soil moisture, and other parameters such as leaf litter development, degree of canopy openness, and presence of coarse woody debris which is a function of necessary soil mycorrhizal associations (Yahner, 2000). Orchids, including the small whorled pogonia, require mycorrhizal fungus in leaf litter for germination and seedling development (U. S. Fish and Wildlife Service, 1992; Jackson and Mason, 1984).

Based on the variables listed above, the habitat quality of each relatively flat area or slope facing between northwest and southeast was characterized as "low-quality", "medium-quality", or "high-quality" habitat. These designations were determined as follows:

- (A) **"Low-quality"** areas have little or no potential to support small whorled pogonias due to one or more overriding factors, such as open, treeless areas, woods with an immature forest canopy, very dense shrub/sapling or understory vegetation, overgrown groundcover, or very dry or wet soil conditions. Because small whorled pogonias

³ U.S. Army Corps of Engineers, based on routine consultation with the U. S. Fish and Wildlife Service, typically recommends that surveys for small whorled pogonia be conducted in northern Virginia between June 1 and July 20. Neither the Corps nor the Service has requested that a small whorled pogonia survey be conducted on the site; however, the Virginia Department of Conservation and Recreation-Division of Natural Heritage has recommended a survey (VDCR, 2004).

rarely occur on slopes facing south or west, areas sloping in these directions are considered "low-quality" unless most other habitat parameters are favorable for the species. Areas dominated overwhelmingly by Virginia pine are also considered "low-quality". Also, because small whorled pogonias are not known to occur in Virginia in areas dominated by chestnut oak (*Quercus prinus*) or southern red oak (*Quercus falcate*) (Ware, 1995), areas strongly dominated by these species are considered "low-quality" unless other factors are optimal (in which case these areas are rated as "medium-quality").

(B) **"Medium-quality"** habitat areas provide conditions approaching, but differing somewhat from, the "typical" conditions for small whorled pogonias in Virginia, as described in the literature. For example, habitat that is otherwise "high-quality" for the small whorled pogonia is considered "medium-quality" if:

- the forest canopy trees are somewhat younger or more closely spaced than in typical habitat;
- if the canopy includes moderate numbers of trees (such as Virginia pine and chestnut oak) with which the small whorled pogonia is not typically associated;
- if the understory or ground cover is moderately dense or is composed of species with which the pogonia is not typically associated; and/or,
- if the slope is fairly steep or faces northwest or southeast.

"Medium-quality" areas may also include habitat areas that are mostly "low-quality" due to one or more overriding factors (as described above), but have some potential for occurrence of the small whorled pogonia due to the presence of small patches of "medium-" or "high-quality" habitat. For example, small, limited areas on the site with distinctive "rich woods" vegetation and soils were identified and searched as "low-quality" habitat. Similarly, ridge tops on the site with relatively sparse or thicker shrub and herb cover, but with a dominance of chestnut oak and Virginia pines were considered "low-quality" habitat.

(C) **"High-quality"** habitat areas provide conditions similar to those described for typical small whorled pogonia colonies in Virginia (Ware, 1991). Chief among the factors considered as optimal habitat variables are evidence of past agricultural use, low nutrient, acidic sandy soils, open shrub and herbaceous layer, and canopy openings that allow filtered sunlight to reach the forest floor.

After habitat quality was initially evaluated, field mapped, and thereafter refined, all "high-quality" and "medium-quality" habitat areas on the site were thoroughly and carefully searched for individual small whorled pogonias. Parallel search transects spaced at approximately 20 feet apart (or less) were walked along the contours of the slope while observers inspected the forest floor closely for small whorled pogonias. Observers walked along these transects, looking both for pogonias and for patches of better microhabitat. Where this better habitat existed (*i.e.*, "high-quality" habitat), searches using more closely spaced transects (10 to 15 feet apart) were performed. Areas having concentrations of decaying plant material, near well-lit gaps, and/or supporting concentrations of plants known to grow in association with small whorled pogonia were scrutinized particularly carefully. Any vegetation on the site having physical similarity to the vegetative form of small whorled pogonia (*i.e.*, Indian cucumber root) was carefully inspected, and positively identified.

The investigators also searched for small whorled pogonias in a number of areas considered "low-quality", both during the initial habitat evaluation transecting and while in transit between search areas. A number of areas identified as "low-quality" habitat were searched using transects spaced no less than 20 feet apart to ensure adequate survey coverage, and to reduce sampling bias.

Suitable small whorled pogonia habitat areas were identified and mapped on a topographic map (Attachment I) into categorical types using "low-quality", "medium-quality" and "high-quality" identifiers. Representative photographs of the site's habitat types and search areas were obtained, and appear in Exhibit 5.

Habitat Evaluation/Search Findings

Using the methods described above, the areas most likely to support small whorled pogonias were checked thoroughly and carefully, while a number of areas that might not be expected to support the species were also inspected to a degree commensurate with observed or measured habitat quality parameters. As indicated on Attachment 1, WSSI searched all portions of the study area that provided habitat that was considered suitable (i.e., "high quality") and moderately or marginally suitable (i.e., "medium-quality") for the small whorled pogonia. However, no small whorled pogonias were found in the study area, and given the intensity with which the highest-quality areas were searched and the extensive nature of the search for this species (i.e., encompassing marginal and some submarginal areas as well), it is WSSI's opinion that there is a low probability that this species occurs in the study area. Results of the habitat evaluation and search for specific portions of the study area follow.

Two "high-quality" habitat areas, Area 1 (Exhibit 7, Photo #1) and Area 2 (Exhibit 7, Photo #2), were identified, as depicted on Attachment I. Area 1 is a small valley with a northwest to northeast exposure. This area is dominated by large American beech and tulip poplar, especially in the lower part. There is a low density of beech and black gum saplings and a very open herbaceous layer that includes a large number of small whorled pogonia associates, including Indian cucumber-root, maple-leaved viburnum, Virginia creeper, striped wintergreen, Solomon's-seal, false Solomon's-seal, mountain laurel, catbrier, lowbush blueberry, American strawberry bush, naked-flowered tick-trefoil, New York fern, and Christmas fern. Area 2 has a northeastern exposure and is dominated by large American beech, tulip poplar, and white oak. It has an open herbaceous layer supporting a number of small whorled pogonia associates, including Solomon's-seal, false Solomon's-seal, naked-flowered tick-trefoil, maple-leaved viburnum, striped wintergreen, and Indian cucumber-root. Both areas were thoroughly searched, but no small whorled pogonias were found.

Potential habitat for the small whorled pogonia was also found at three areas (Areas 3, 4, and 5) considered "medium-quality" for the species. Area 3 (Exhibit 7, Photo #3) is a relatively level, somewhat xeric area adjacent to an abandoned building in the southeastern portion of the site. This area supports large American beech, white oak, and black gum. The forest in Area 3 has a medium density of saplings but an open herbaceous layer that includes a number of small whorled pogonia associates, including striped wintergreen, American strawberry bush, maple-leaved viburnum, Solomon's-seal, false Solomon's-seal, naked-flowered tick-trefoil, and Indian cucumber-root. Area 4 (Exhibit 7, Photo #4) is in the lower end of a valley and has a southeastern exposure. It is dominated by American beech and tulip poplar and has a number of small whorled pogonia associates, including mountain laurel, maple-leaved viburnum, false Solomon's-seal, Indian cucumber-root, New York fern, and

naked-flowered tick-trefoil, in the shrub and herbaceous layers. Area 5 is located on the lower part of a north-facing valley slope and the adjacent valley floor. It is dominated by American beech and white oak and supports a number of small whorled pogonia associates, including mountain laurel, lowbush blueberry, striped wintergreen, and maple-leaved viburnum, in the understory and herbaceous layers. However, parts of the slope in Area 5 are somewhat densely vegetated with mountain laurel. All of these "medium-quality" habitat areas were searched thoroughly for small whorled pogonias, but no individuals were detected.

The remainder and the majority of the study area was determined to be unsuitable for the small whorled pogonia (i.e., "low-quality" habitat), and all areas not marked by yellow hatching on Attachment I are considered unsuitable for the small whorled pogonia. The potential habitat for the small whorled pogonia is sparse or of "low-quality" in these areas for a number of reasons. Examples of factors that limit habitat quality in these marginal areas are as follows:

- dense young forest vegetation dominated Virginia pine saplings or invasive species such as tree-of-heaven (*Ailanthus altissima*) Japanese honeysuckle (*Lonicera japonica*) and/or Japanese knotweed (*Polygonum cuspidatum*) (Exhibit 7; Photo #5);
- level, dry, gravelly areas with mature Virginia pine and/or chestnut oak, both species with which the small whorled pogonia is typically not associated (Exhibit 7; Photo #6);
- upper gravelly slopes supporting mature dry site species, such as chestnut oak and/or Virginia pine (Exhibit 7; Photo #7);
- trash dumps (Exhibit 7; Photo #8);
- residential areas with houses, other buildings, and lawns (Exhibit 7; Photo #9);
- equipment storage areas (Exhibit 7; Photo #10);
- areas with oldfield vegetation sometimes stockpiled with firewood and woodchips (Exhibit 7; Photo #11).

Nevertheless, due to the fairly wide range of conditions in which the small whorled pogonia occurs over its range and the "atypical" conditions in which the species occurs on rare occasions, transects and spot-checks of some of these ostensibly "low-quality" vegetated areas were conducted by WSSI in an attempt to minimize search bias. No small whorled pogonias were detected in these areas.

Conclusions

No small whorled pogonias were found during the survey of the site. "High-quality" and "medium-quality" habitat for this species is present on the site, but no small whorled pogonias were detected during a thorough search of the site. Given the intensity with which the highest quality areas were searched and the systematic nature of the search for this species (i.e., investigating all "high-quality" and "medium-quality" habitat areas and some "low-quality" habitat areas as well), it is WSSI's opinion that there is a low probability that this species occurs on the site, based on the negative search results and largely unfavorable habitat parameters on the site for the small whorled pogonia.

Upon your authorization, we will forward a copy of this report to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the Virginia Department of Conservation and Recreation-Division of Natural Heritage to obtain their concurrence that the small whorled pogonia will not become a constraining land development issue during the anticipated federal, state and local wetlands permitting process.

Limitations

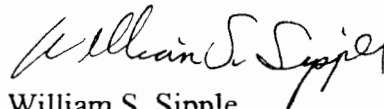
This study is based on examination of the habitat conditions on the study site at the time of our review and does not address conditions at a given time in the future. Such habitat conditions change over time. In addition, small whorled pogonias may remain dormant for several years, without any visible above-ground stems or leaves, between appearances above-ground. Therefore, our conclusions may vary from future observations.

Our habitat evaluation, small whorled pogonia search, and report have been prepared in accordance with generally accepted guidelines for the conduct of such surveys. We make no other warranties, either expressed or implied, and our report is not a recommendation to buy, sell or develop the property.

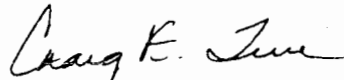
If you have any questions regarding this habitat evaluation, please call our office at (703) 631-5800.

Sincerely,

WETLAND STUDIES AND SOLUTIONS, INC.



William S. Sipple
Wetland Ecologist



Craig E. Turner, P.W.S.
Principal Environmental Scientist



Mark Headly, P.W.S.
Vice President

Enclosures

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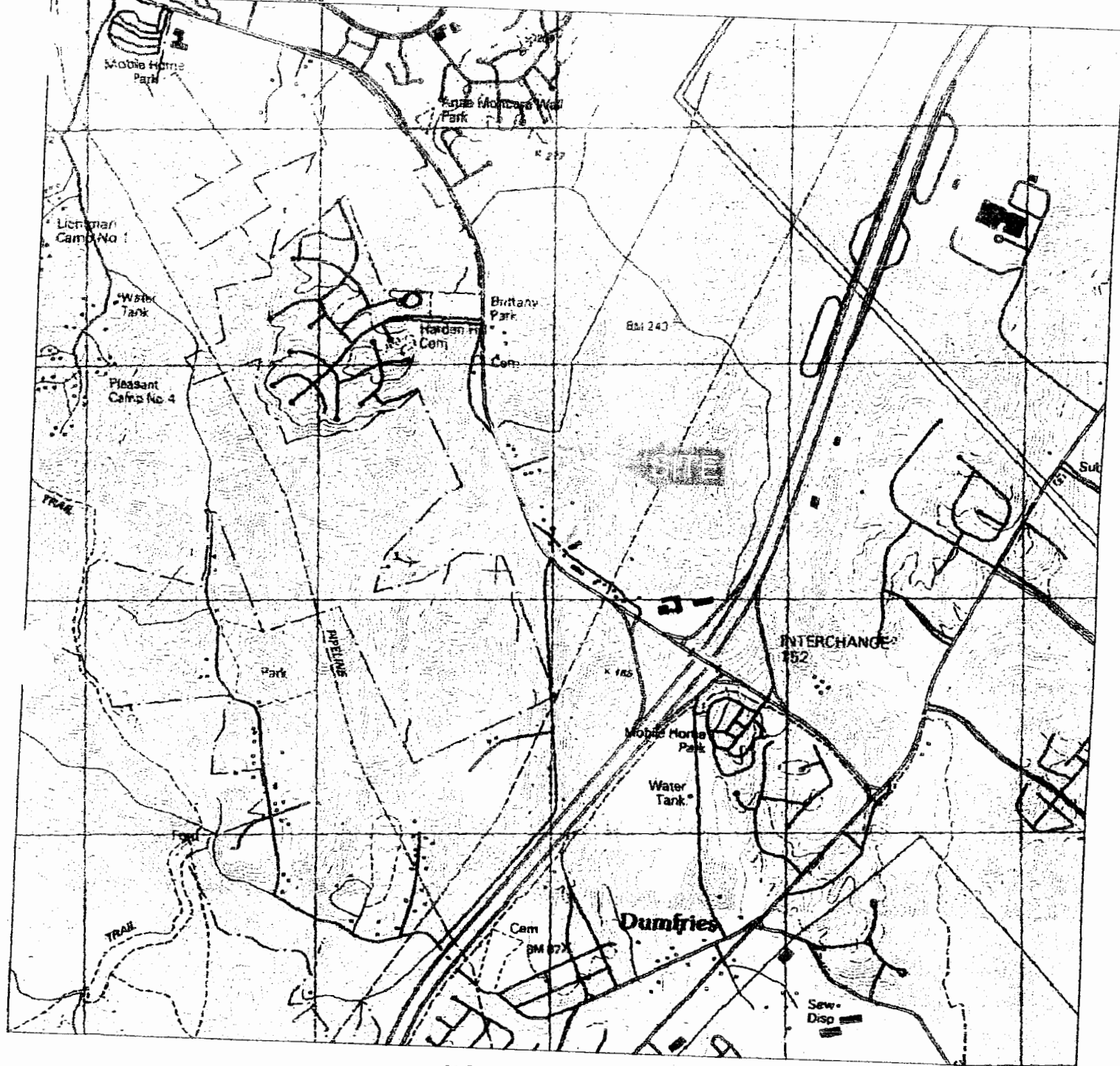
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LITERATURE CITED

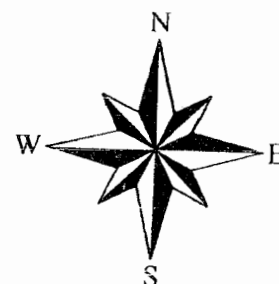
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USGS Quad Map
Quantico, VA 1994
Dumfries Road at Talon Drive
WSSI #10435
Scale: 1" = 2000'



Latitude: 38°35'10"

Longitude: 77°19'50"

Hydrologic Unit Code (HUC): 02070011

Stream Class: III

Name of Watershed: Unnamed Tributary of Quantico Creek

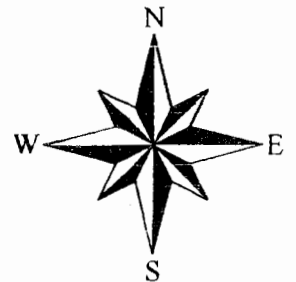
Wetland Studies and Solutions, Inc.

2H6V1 507

Exhibit 2

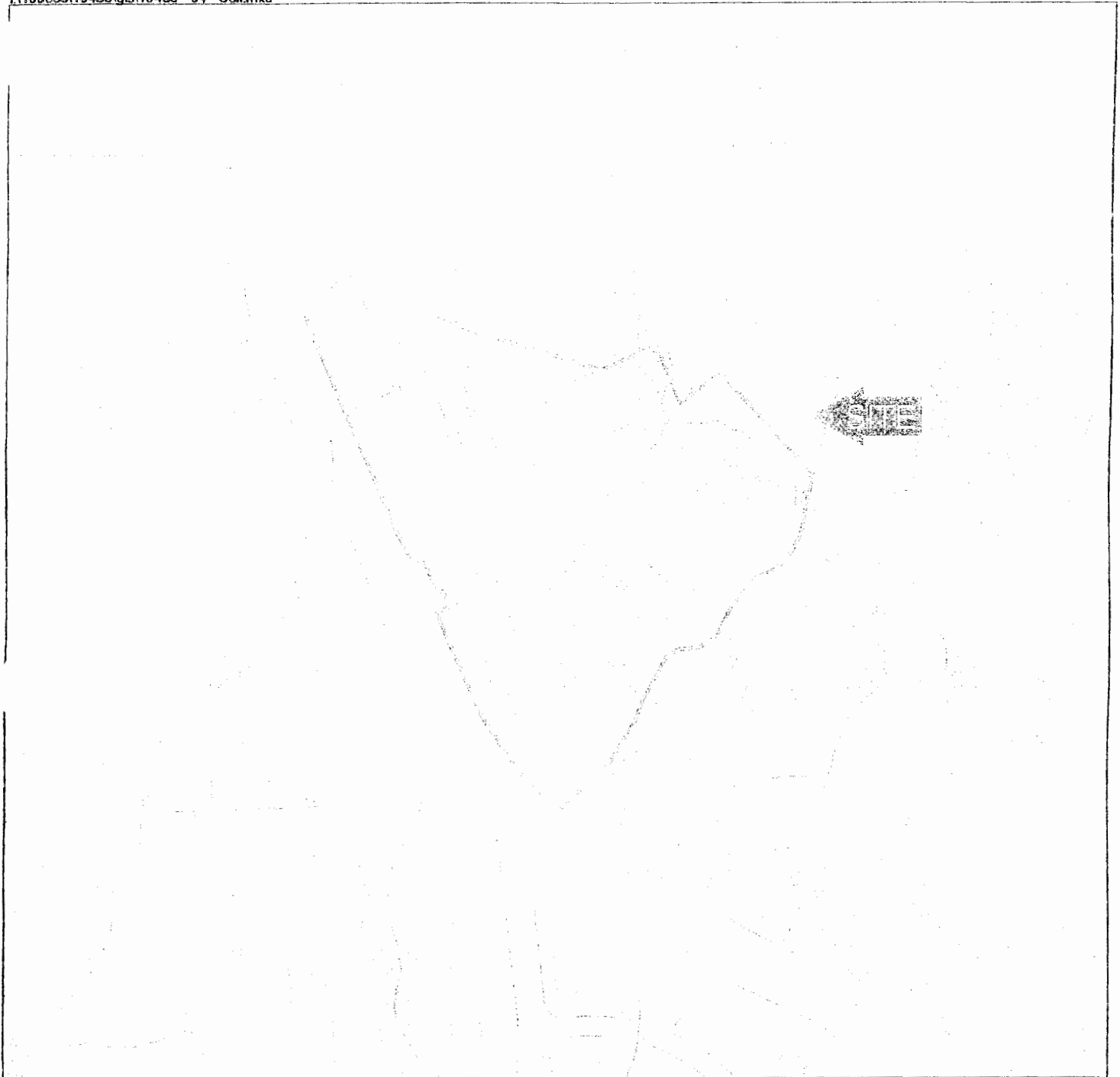


**Spring 2004 Color Infrared Imagery
Dumfries Road at Talon Drive
WSSI #10435
Scale: 1" = 300'**

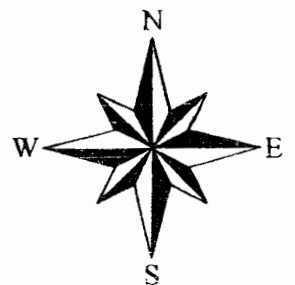


to Source: Wetland Studies and Solutions, Inc.

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Soils Map
Prince William County Digital Data
Dumfries Road at Talon Drive
WSSI #10435
Scale: 1" = 500'



- Hydric Soils
- Soils with Hydric Inclusions
- Non-hydric Soils

MAPPED SOILS REPORT FOR DUMFRIES ROAD AT TALON DRIVE

Project No: 10435
 Applicant/Owner: Zimmer Development Company, LLC
 County Name: Prince William
 State: Virginia

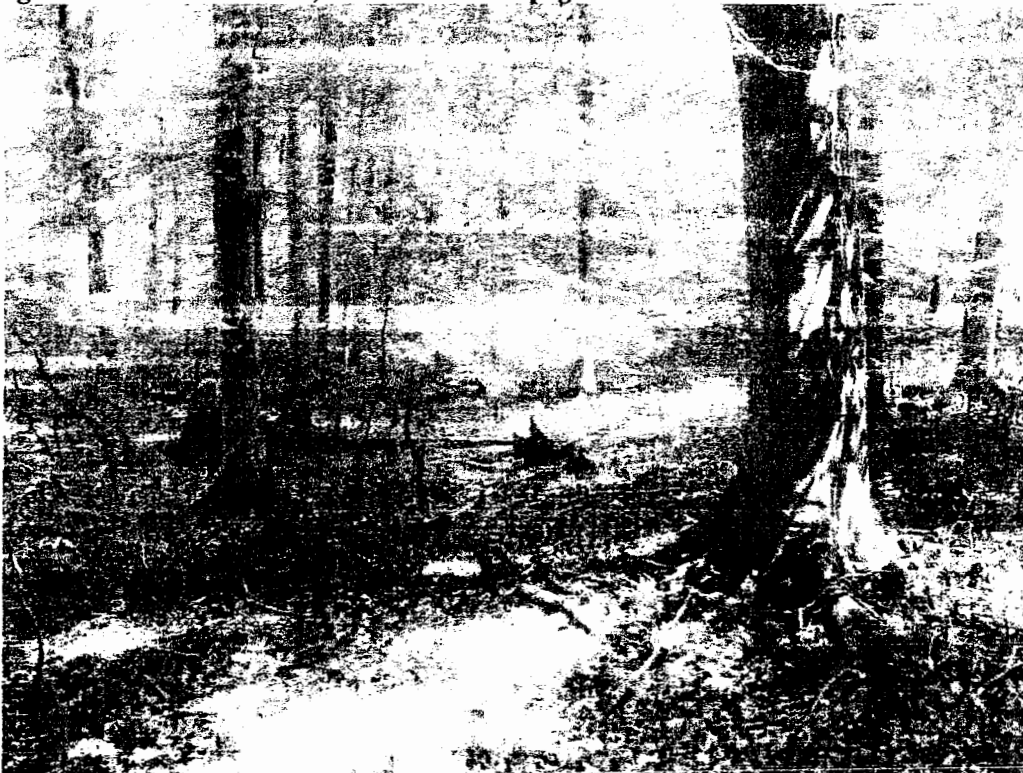
Map Symbol	Map Unit Name	Taxonomy	Drainage Class	Hydric	Hydric	Hydric
				National List	Local List	Inclusions
18C	Dumfries sandy loam 7-15%	Ultic Hapludalfs	well drained	NO	NO	NO
18D	Dumfries sandy loam 15-25%	Ultic Hapludalfs	well drained	NO	NO	NO
18E	Dumfries sandy loam 25-50%	Ultic Hapludalfs	well drained	NO	NO	NO
27A	Hatboro-Codorus 0-2%	Typic Fluvaquents	poorly drained	YES	YES	FREQ FLOODING
47B	Quantico sandy loam 2-7%	Typic Hapludults	well drained	NO	NO	NO
47C	Quantico sandy loam 7-15%	Typic Hapludults	well drained	NO	NO	NO

2H6V1510

EXHIBIT 5
SITE PHOTOGRAPHS
DUMFRIES ROAD AT TALON DRIVE
WSSI #10435



- #1. Looking north at Area 1. This "high-quality" habitat area is dominated by large American beech and tulip poplar. It has a very open herbaceous layer and supports a large number of small whorled pogonia associates. However, no small whorled pogonias were found.



- #2. Looking east at Area 2. This "high-quality" habitat area has a northeastern exposure and is dominated by large American beech, tulip poplar, and white oak. It has an open herbaceous layer and supports a number of small whorled pogonia associates. However, no small whorled pogonias were found.

2H6V1511

EXHIBIT 5
SITE PHOTOGRAPHS
DUMFRIES ROAD AT TALON DRIVE
WSSI #10435



- #3. Looking northwest at Area 3. This "medium quality" habitat area is relatively level and somewhat xeric. It is located adjacent to an abandoned residential building, but supports large American beech, white oak and black gum with a medium-density sapling layer. This area has a very open herbaceous layer that supports a number of small whorled pogonia associates, but no small whorled pogonias were found.



- #4. Looking northeast at Area 4. This "medium quality" habitat area is located in the lower end of a valley and has a southeastern exposure. It is dominated by American beech and tulip poplar, and supports a number of small whorled pogonia associates. However, no small whorled pogonias were found.

2H6V1512

**EXHIBIT 5
SITE PHOTOGRAPHS
DUMFRIES ROAD AT TALON DRIVE
WSSI #10435**



#5. Looking north at a dense stand of Virginia pine saplings. Such areas are unsuitable habitat for the small whorled pogonia, and no small whorled pogonias were found..



#6. Looking north at a forested flat dominated by mature Virginia pines. Such areas are unsuitable habitat for the small whorled pogonia, and no small whorled pogonias were found.

**EXHIBIT 5
SITE PHOTOGRAPHS
DUMFRIES ROAD AT TALON DRIVE
WSSI #10435**

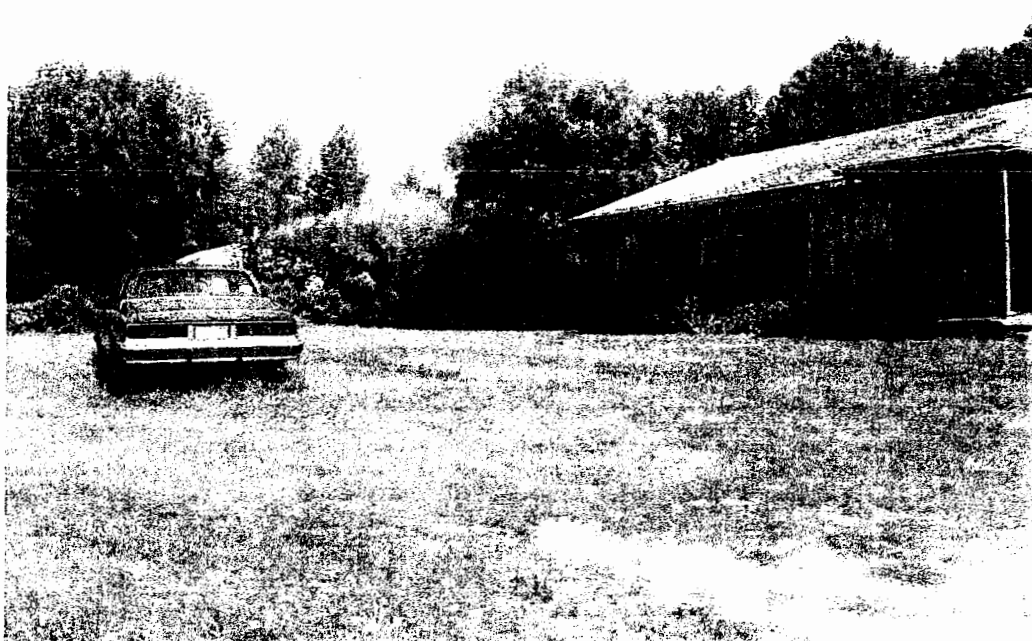


#7. Looking north at a gravelly slope supporting mature Virginia pine. Such areas are unsuitable habitat for the small whorled pogonia, and no small whorled pogonias were found.



#8. Looking south at a dump in a small valley near an abandoned residential building. Such areas are unsuitable habitat for the small whorled pogonia, and no small whorled pogonias were found.

**EXHIBIT 5
SITE PHOTOGRAPHS
DUMFRIES ROAD AT TALON DRIVE
WSSI #10435**

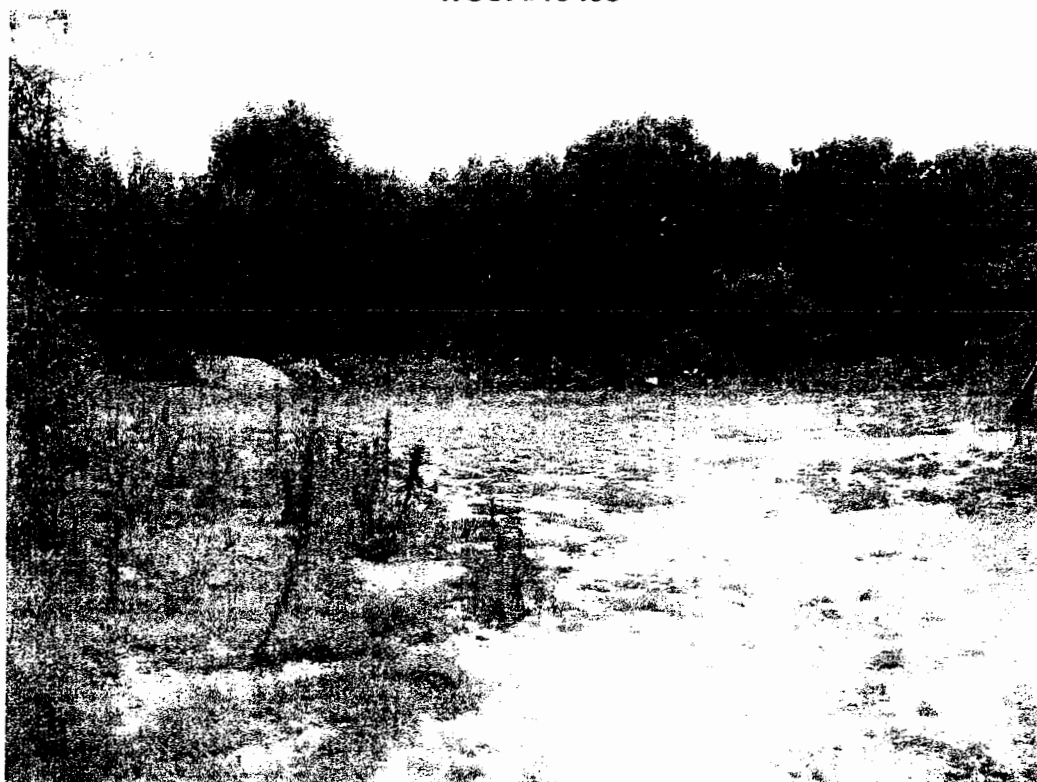


#9. Looking north at an occupied residential building near Route 234 (Dumfries Road). Such areas are unsuitable habitat for the small whorled pogonia, and no small whorled pogonias were found.



#10. Looking south at a field used to store assorted equipment. Such areas are unsuitable habitat for the small whorled pogonia and no small whorled pogonias were found.

**EXHIBIT 5
SITE PHOTOGRAPHS
DUMFRIES ROAD AT TALON DRIVE
WSSI #10435**



- #11. Looking north at an area supporting oldfield vegetation. Note the stockpiled wood chips and firewood in the background. Such areas are unsuitable habitat for the small whorled pogonia, and no small whorled pogonias were found.**

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 4-5-05

Time: 11:45 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

- ☐ Pre-construction Conference ☐ Rough Grading/Utilities ☒ Temporary Stabilization ☐ Finish Grading
☐ Clearing and Grubbing ☐ Road Prep/Paving ☒ Building Construction ☐ Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		4/15/05

COMMENTS: Much of the trail is still not seeded and mulched. This needs to be done ASAP.

Individual Lots (K. Hovnanian) –

Lot 13 – OK

Lot 14 – Seed & mulch side area back to drop inlet REPEAT

Lot 27 – OK

Lot 29 - silt fence is not entrenched

Lot 30 - Needs a construction entrance and repair silt fence

Lot 31 – OK

Lot 32 - Repair silt fence.

Lot 34 – re-install silt fence or sod REPEAT

Lot 41 –Repair silt fence

Lot 43 – bare spots by curb / seed and mulch

Lot 44 – OK

Lot 46 – OK

Lot 47 - Needs more stone / Repair silt fence

Lot 48 – OK

Lot 50 – repair silt fence

Lot 78 – OK

Lot 79 – OK

Lot 80 – OK

Lot 81 – Water is being pumped and it is flowing under the silt fence and towards the wetlands. Filter pumped water.

Lot 82 – OK

Lot 83 – Entrance OK - Needs silt fence - Replace curb and gutter inlet protection in front of lot.

Lot 84 – Sod or re-install silt fence

Lot 85 – OK

Lot 86 – Entrench silt fence

Lot 87 – OK

Lot 88 – OK

Lot 89 – entrench silt fence

Lot 90 – entrench silt fence in front

Verbal notification given to: Talked with George & Tommy

Completion deadlines: 4/14/05

Report prepared by: _____

Debbie Switzer

Written notification given to: Vint Hill EDA

Dave Simons, Miller & Smith

George Rosenberger, K. Hovnanian

From the desk of...

Debbie Switzer

E&S Program Manager

John Marshall SWCD

98 Alexandria Pike, Suite 31

Warrenton, VA 20186

(540) 347-3120 ext 3

Fax: (540) 349-0878

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 3-17-05

Time: 10:30 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference

Rough Grading/Utilities

☒ Temporary Stabilization

Finish Grading

Clearing and Grubbing

Road Prep/Paving

☒ Building Construction

Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		3/24/05

COMMENTS: Silt fence is in place behind lots 84 & 85. Curb and gutter inlet protection has been replace at the end of Osborne Dr. Thanks. **Silt fence throughout the site is in poor shape.**

Individual Lots (K. Hovnanian) -

Lot 13 - **Repair silt fence / construction entrance looks good - use it!**

Lot 14 - **Seed & mulch side area back to drop inlet REPEAT**

Lot 27 - **OK**

Lot 29 - **Paved driveway / Fix silt fence - REPEAT**

Lot 30 - **Needs silt fence**

Lot 31 - **OK**

Lot 32 - **Needs stone for construction entrance.**

Lot 34 - **re-install silt fence or sod**

Lot 41 - **Clean up in front**

Lot 44 - **Repair silt fence**

Lot 46 - **Repair silt fence / need a construction entrance**

Lot 47 - **Repair silt fence / need a construction entrance**

Lot 48 - **repair silt fence / needs more stone on entrance REPEAT**

Lot 50 - **fix silt fence**

Lot 78 - **Ok**

Lot 79 - **Repair silt fence / needs a construction entrance**

Lot 80 - **Fix silt fence / construction entrance needs stone**

Lot 81 - **Clean up construction entrance / repair silt fence**

Lot 82 - **Replace silt fence**

Lot 83 - **Needs silt fence**

Lot 84 - **Sod or re-install silt fence**

Lot 85 - **OK**

Lot 86 - **Repair silt fence or sod**

Lot 87 - **Fix silt fence**

Lot 88 - **Fix silt fence**

Lot 89 - **Fix silt fence**

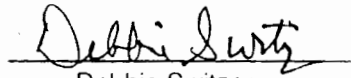
Lot 90 - **Repair silt fence in front**

Repair silt fence behind lot 79, 80, and 81.

Verbal notification given to: Talked with Tommy

Completion deadlines: 3/24/05

Report prepared by:


Debbie Switzer

From the desk of...
Debbie Switzer
E&S Program Manager
John Marshall SWCD
98 Alexandria Pike, Suite 31
Warrenton, VA 20186

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnanian

(540) 347-3120 ext 3
Fax: (540) 349-0878



John Marshall Soil & Water Conservation District

Commonwealth of Virginia



98 Alexandria Pike, Suite 31, Warrenton, VA 20186-2849
(540) 347-3120

FOR YOUR INFORMATION, ATTACHED IS A COPY OF THE LATEST EROSION AND SEDIMENT CONTROL (E&S) INSPECTION REPORT FOR YOUR PROJECT. IT IS REQUESTED THAT ANY CORRECTIVE ACTION NOTED BE HANDLED AS SOON AS POSSIBLE.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL ME AT 540-347-3120.

**DEBBIE SWITZER
E&S PROGRAM MANAGER**



EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 3-3-05

Time: 2:30 PM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference	Rough Grading/Utilities	<input checked="" type="checkbox"/> Temporary Stabilization	Finish Grading
Clearing and Grubbing	Road Prep/Paving	<input checked="" type="checkbox"/> Building Construction	Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		3/11/05

COMMENTS: Still need to repair the silt fence behind lots 84 & 85. Please replace curb and gutter inlet protection at the end of Osborne Dr. The remainder of the project is in pretty good shape. Please maintain the construction entrances and silt fence and keep the roads clean as needed.

**There are areas along the trail that need to be final stabilized. This is a good time of year to seed and mulch!

Individual Lots (K. Hovnanian) –

Lot 13 – **Repair silt fence / needs more stone on construction entrance**

Lot 14 – **Seed & mulch side area back to drop inlet REPEAT**

Lot 27 – OK

Lot 29 – **Fix silt fence - REPEAT**

Lot 30 – **Needs a construction entrance**

Lot 31 – OK

Lot 32 – OK

Lot 34 – OK

Lot 41 – OK

Lot 44 – OK

Lot 48 – **repair silt fence / needs more stone on entrance REPEAT**

Lot 50 – **fix silt fence**

Lot 67 – **clean up road b lot 67**

Lot 78 – OK

Lot 80 – **Fix silt fence**

Lot 82 – **Replace silt fence**

Lot 84 – OK

Lot 85 – OK

Lot 86 – **Repair silt fence**

Lot 87 – **Fix silt fence and construction entrance**

Lot 88 – **Fix silt fence and construction entrance**

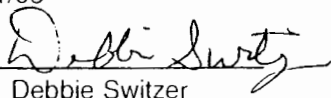
Lot 89 – **Fix silt fence and construction entrance**

Lot 90 – OK

Verbal notification given to: Talked with Tommy

Completion deadlines: 3/11/05

Report prepared by:


Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnanian

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 2-17-05

Time: 10:25 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		3/1/05

COMMENTS: Silt fence has been added along Averbach Ct. Thanks. Averbach Ct. is still very messy. Please scrape / sweep it. Several curb and gutter inlet protections have been replaced. The one in front of lots 83 / 84 needs to be replaced. Also need to repair the silt fence behind lots 84 & 84. Please note that there are several repeat violations.

****There are areas along the trail that need to be final stabilized. This is a good time of year to seed and mulch!**

Individual Lots (K. Hovnanian) –

Lot 13 – **Repair silt fence / needs more stone on construction entrance / clean up roadway in front along Shugart**

Lot 14 – **Seed & mulch side area back to drop inlet**

Lot 27 – **sod or seed and mulch**

Lot 29 - **Fix silt fence - REPEAT**

Lot 30 - **Repair silt fence / Needs a construction entrance**

Lot 31 – OK

Lot 32 - OK

Lot 34 – OK

Lot 41 – Clean up road in front.

Lot 44 – **Repair silt fence**

Lot 48 – **Clean up in front / repair silt fence / needs more stone on entrance REPEAT**

Lot 50 – **Needs a construction entrance**

Lot 78 – paved driveway / silt fence - Ok

Lot 80 – OK

Lot 82 – Needs a construction entrance

Lot 84 – **Clean up road in front / Repair silt fence – replace curb & gutter inlet in front REPEAT**

Lot 85 – **Clean up road in front / Repair silt fence**

Lot 86 – OK

Lot 87 – **Clean up road in front / Needs a construction entrance**

Lot 88 – **Clean up road in front**

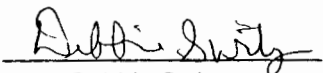
Lot 89 – **needs silt fence REPEAT**

Lot 90 – **Repair silt fence REPEAT**

Verbal notification given to: Talked with Tommy

Completion deadlines: 3/1/05

Report prepared by:


Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnanian

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

Inspection Date: 2/4 & 7/05

Time: 1:30 PM

File No.

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference	Rough Grading/Utilities	<input checked="" type="checkbox"/> Temporary Stabilization	Finish Grading
Clearing and Grubbing	Road Prep/Paving	<input checked="" type="checkbox"/> Building Construction	Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		2-14-05

COMMENTS: They are hauling from lot 13 to Averbach Ct. Please add silt fence along the curb in front of the stock piles on Averbach Ct.

Talked with Tommy – they are in the process of replacing several curb and gutter inlet protections.

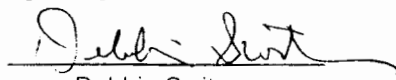
Individual Lots (K. Hovnanian) –

Lot 13 – OK
Lot 27 – **Repair silt fence, especially near the curb and gutter inlet.**
Lot 29 – **Fix silt fence**
Lot 30 – **Clean up in front / Repair silt fence**
Lot 31 – silt fence OK
Lot 32 – OK
Lot 34 –
Lot 41 – OK.
Lot 44 – OK
Lot 48 – **Clean up in front of SF.**
Lot 78 – paved driveway / silt fence - Ok
Lot 80 – OK
Lot 81 –
Lot 82 – OK
Lot 84 – **Needs silt fence – replace curb & gutter inlet in front**
Lot 85 – **Repair silt fence**
Lot 86 – OK
Lot 87 – **CE needs more stone**
Lot 88 – Has 3 piles of stone in front.
Lot 89 – **needs silt fence REPEAT**
Lot 90 – **Repair silt fence REPEAT**

Verbal notification given to: Talked with George on Friday and Tommy on Monday

Completion deadlines: 2-14-05

Report prepared by:


Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnanian

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 1/20/05

Time: 1:10 PM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		

COMMENTS: Lot 48 and the roadways in that area are a mess. I've issued a STOP inspection on lot 48. Please add a construction entrance and silt fence for this lot and clean up all of Averbach Court. Sutherland Ct. looks better. Thanks

Individual Lots (K. Hovnanian) –

Lot 13 – **fix silt fence / clean up road in front.**

Lot 14 – Please add curb and gutter inlet protection until the area by lot 14 is stabilized.

Lot 27 – OK

Lot 28 – Complete - RTC

Lot 29 - **Fix silt fence**

Lot 31 –silt fence OK / Paved driveway

Lot 34 – OK.

Lot 41 – OK.

Lot 42 – Complete - RTC

Lot 44 – Repair Silt fence

Lot 48 – Needs stone for construction entrance / Repair silt fence REPEAT STOP work order issued

Lot 78 – paved driveway / silt fence - Ok

Lot 80 – Silt fence OK / **needs stone for construction entrance REPEAT**

Lot 81 – **Repair silt fence in back**

Lot 82 – CE – good

Lot 84 – OK

Lot 85 – OK

Lot 86 – OK

Lot 87 – **Repair silt fence and clean up CE**

Lot 88 – **Needs stone CE**

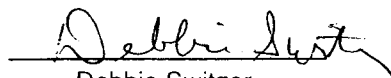
Lot 89 – Repair silt fence

Lot 90 – Repair silt fence

Verbal notification given to: Talked with George

Completion deadlines:

Report prepared by:


Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnanian

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 12/21/04

Time: 10:25 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		12/27/04

COMMENTS: I talked with Tim Harms – they will install silt fence on the lower side of the trail where it is protected. They will seed and mulch after final grade.

Southerland Court is better, but still messy. Please shovel and clean the road.

Individual Lots (K. Hovnanian) –

Lot 13 – OK

Lot 14 – OK – **Please clean curb and gutter inlet protection in front of Lot 14.**

Lot 23 – Complete – RTC.

Lot 25 – Silt fence – OK / yard mulched

Lot 26 – Complete – Return to County

Lot 27 – **Repair silt fence / Needs stone for construction entrance.**

Lot 28 – **Repair silt fence** / Driveway is paved.

Lot 29 - **Repair silt fence**

Lot 31 – **Construction entrance needs stone.**

Lot 32 – **Construction entrance needs stone.**

Lot 33 – Complete – Return to County

Lot 34 – Construction entrance - good / **Needs silt fence REPEAT**

Lot 41 – OK

Lot 42 – Silt fence - OK / Drive way paved.

Lot 43 – **Complete - RTC.**

Lot 44 – **Needs more stone for construction entrance / Repair silt fence**

Lot 48 – Needs stone for construction entrance / Repair silt fence

Lot 78 – **Needs stone** / silt fence - Ok

Lot 82 – Construction entrance – good / **Needs silt fence behind it**

Lot 84 – Construction entrance - OK / **Repair silt fence behind lot. REPEAT**

Lot 85 – Construction entrance - OK

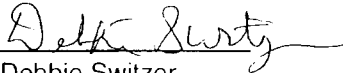
Vint Hill Landbay G
12/21/04

Lot 86 – OK
Lot 87 – **Needs more stone on construction entrance**
Lot 88 – **Needs a construction entrance REPEAT**
Lot 89 – **Needs construction entrance REPEAT**
Lot 90 – **Repair silt fence.**

Lots 35, 36, 37, 39, and 80 are not activated for inspection yet, but they all need construction entrances.

Verbal notification given to: Talked with Tommy and George

Completion deadlines: 12/27/04

Report prepared by: 
Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnanian

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 12/8/04

Time: 11:45 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		12/15/04

COMMENTS: The trail between this section and the wetlands needs to be seeded and mulched ASAP.

Southerland Court is extremely messy. Please shovel and clean the road, install construction entrances for each lot and maintain the silt fence around the lots.

There are several curb and gutter inlets that are full and need to be replaced – Shugart Court and on Osborne Dr. near lot 27. Please also clean the road in front of these inlets.

Individual Lots (K. Hovnanian) –

Lot 13 – **Construction entrance needs more stone; repair silt fence REPEAT**

Lot 14 –

Lot 18 – complete - RTC

Lot 25 – **Needs sod or silt fence REPEAT**

Lot 27 – **Needs silt fence**

Lot 28 – Silt fence – OK / Construction entrance – good

Lot 29 - Silt fence – OK / **Construction entrance needs stone**

Lot 30 – Silt fence – OK / **Construction entrance needs stone**

Lot 31 – **Clean up around entrance**

Lot 32 – silt fence OK / **Needs construction entrance.**

Lot 33 – **Needs sod or silt fence.**

Lot 34 – Construction entrance - good / **Needs silt fence**

Lots 35 – 37 (Needs construction entrance / repair silt fence

Lot 41 – **Needs construction entrance and silt fence REPEAT**

Lot 38 – OK

Lot 39 – **Needs construction entrance**

Lot 40 - **Needs more stone**

Lot 41 – **Needs stone**

Lot 42 – **Repair silt fence / Clean up road in front.**

Lot 43 – **Repair silt fence / Clean up road in front.**

Lot 44 – **Needs more stone**

Lot 78 – **Use existing construction entrance and maintain silt fence.**

Lot 79 – **Needs stone for construction entrance**

Lot 80 – **needs construction entrance**

Lot 81 – **Maintain silt fence in front and back**

Lot 82 – **Needs silt fence behind it**

Lot 83 – **Needs silt fence**

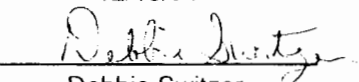
Lot 84 – **Repair silt fence behind lot. REPEAT**

Vint Hill Landbay G
12/8/04

Lot 85 – **Maintain silt fence / needs more stone.**
Lot 86 – **Repair silt fence** / Construction entrance – OK
Lot 87 – **Maintain silt fence** / Needs more stone
Lot 88 – **Needs a construction entrance**
Lot 89 – **Needs construction entrance**
Lot 90 – **Construction entrance needs more stone / maintain silt fence.**

Verbal notification given to: Talked with George and Tommy on site.

Completion deadlines: 12/15/04

Report prepared by: 
Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
George Rosenberger, K. Hovnarian

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Vint Hill Landbay H
11/22/04

Miller & Smith Homes

Comrie Court is messy. Each lot needs an individual construction entrance and silt fence around the lot. The construction trailer needs more stone on entrance to prevent tracking.

Lot 9 - OK - RTC

Lot 10 - OK - RTC

Lot 11 - **Repair silt fence / Need more stone on entrance.**

Lot 12 - **Repair silt fence** / construction entrance OK

Lot 13 - **Repair silt fence / construction entrance needs stone**

Lot 14 - **Needs silt fence** / construction entrance OK

Lot 15 - **Repair silt fence** / construction entrance -OK

Lot 16 - **Repair silt fence / Needs construction entrance REPEAT**

Lot 17 - **Repair silt fence / Needs construction entrance REPEAT**

Lot 18 - **Repair silt fence / Needs construction entrance REPEAT**

Lot 75 - OK - RTC

Lot 76 - **Need silt fence in back corner. ***

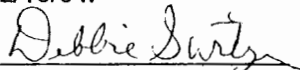
Lot 77 - OK

Lot 78 - silt fence - OK / **Construction entrance needs stone.**

Verbal notification given to: Spoke with Nelson

Completion deadlines: 12/16/04.

Report prepared by:


Debbie Switzer

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Milton Seabolt, Engle Homes
Steve Bryson, Engle Homes
Nelson Green, Miller & Smith Homes

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 10/28/04

Time: 2:10 PM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		

COMMENTS: Please install construction entrance and silt fence for each lot. All equipment leaving the road must use stone construction entrances.

Individual Lots (K. Hovnanian) –

Lot 3 – **There is a bare area in back. Needs sod or seed and mulch. REPEAT**

Lot 12 – Complete - RTC

Lot 13 – Construction entrance OK; **repair silt fence**

Lot 14 – D/W entrance paved; silt fence OK

Lot 16 – Complete RTC

Lot 18 – Apron and side walk in.

Lot 20 – Complete - RTC

Lot 21 - Complete - RTC

Lot 22 - Complete - RTC

Lot 25 – **Repair silt fence ; dress up construction entrance**

Lot 28 – **Needs silt fence and Construction entrance REPEAT**

Lot 29 - **Needs construction entrance**

Lot 30 – **Needs construction entrance / repair silt fence**

Lot 31 – construction entrance good / **repair silt fence**

Lot 32 – **Reinstall silt fence / needs construction entrance**

Lot 33 – **repair silt fence**

Lot 34 – **Needs construction entrance / Needs silt fence REPEAT**

Lot 40 – **Needs construction entrance and silt fence**

Lot 41 – **Needs construction entrance and silt fence**

Lot 42 – Construction entrance OK / **Needs silt fence**

Lot 43 – **Needs construction entrance and silt fence REPEAT**

Lot 44 – **Needs construction entrance / silt fence OK**

Lot 78 – **Needs silt fence and construction entrance. Clean up road in front!**

Lot 84 – **Needs silt fence and construction entrance**

Lot 86 - **Need silt fence and construction entrance**

Lot 87 – **Needs construction entrance and silt fence**

Lot 90 – silt fence and construction entrance - OK

Verbal notification given to: Spoke with Mr. Rosenburger on site

Completion deadlines: 11/5/04

Report prepared by: Debbie Switzer

Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
George Rosenberger, K. Hovnanian

From the desk of...
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 10/6/04

Time: 8:40 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		

COMMENTS: There are many new lots opening up. Please install construction entrance and silt fence for each lot. All equipment leaving the road must use stone construction entrances.

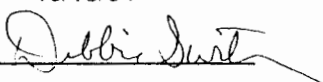
Individual Lots (K. Hovnanian) –

Lot 2 – Complete RTC
Lot 3 – **There is a bare area in back. Needs sod or seed and mulch. REPEAT**
Lot 12 – **Repair silt fence.**
Lot 13 – Not started yet. **Need construction entrance; repair silt fence**
Lot 14 - Construction entrance - OK; **Repair silt fence**
Lot 15 – Complete - RTC
Lot 16 – driveway paved; yard mostly sodded. Some disturbance in back
Lot 17 - Complete - RTC
Lot 18 – **Put up silt fence or extend stone – REPEAT**
Lot 20 – **Needs construction entrance and silt fence - REPEAT**
Lot 21 - **Repair silt fence**
Lot 22 - Paving sidewalk / **install silt fence or sod.**
Lot 24 – Complete – RTC
Lot 25 – **Repair silt fence ; Construction entrance needs stone**
Lot 28 – **Needs silt fence and Construction entrance**
Lot 31 – **Needs silt fence and construction entrance**
Lot 33 – **Clean up construction entrance / repair silt fence**
Lot 34 – **Needs construction entrance / Needs silt fence**
Lot 42 – **Needs construction entrance / Needs silt fence**
Lot 43 – **Needs construction entrance and silt fence**
Lot 78 – Not started yet. Will need silt fence and construction entrance
Lot 84 - Not started yet. Will need silt fence and construction entrance
Lot 86 - Not started yet. Will need silt fence and construction entrance
Lot 91 - Complete - RTC
Lot 93 – paved / silt fence OK
Lot 94 – paved / silt fence OK
Lot 95 – **Needs silt fence or sod**
Lot 96 - Complete - RTC.
Lot 97 – Complete – RTC

Verbal notification given to: Spoke with Mr. Rosenburger on site

Completion deadlines: 10/15/04

Report prepared by:



Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
George Rosenberger, K. Hovnanian

From the desk of...
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 9/9/04

Time: 11:25 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

- ☐ Pre-construction Conference ☐ Rough Grading/Utilities ☒ Temporary Stabilization ☐ Finish Grading
☐ Clearing and Grubbing ☐ Road Prep/Paving ☒ Building Construction ☐ Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		9/17/04

COMMENTS: The cul-de-sac area at Shugart Ct. is very messy. Clean up the road and install silt fence and construction entrances.

Individual Lots (K. Hovnanian) –

Lot 2 – Silt fence – OK / They are getting ready to pave the sidewalk and driveway.
Lot 3 – **There is a bare area in back. Needs sod or seed and mulch.**
Lot 9 – Complete - RTC
Lot 12 – **construction entrance needs stone**; silt fence OK
Lot 13 – **construction entrance needs stone**; silt fence OK
Lot 14 – **Construction entrance needs stone**; silt fence OK
Lot 15 – paved and sodded. – **Bare area in back. Need to sod or seed and mulch.**
Lot 16 – the sidewalk is in, **sod or seed and mulch or put the silt fence back up.**
Lot 17 – **Clean up construction entrance; Needs silt fence**
Lot 18 – **Clean up construction entrance; Needs silt fence**
Lot 19 – Complete - RTC
Lot 20 – **Needs construction entrance and silt fence**
Lot 21 – Silt fence OK; Construction entrance - OK
Lot 22 – Silt fence OK; Construction entrance - OK
Lot 24 – Silt fence OK; Construction entrance - OK
Lot 25 – Silt fence OK; **Construction entrance needs stone**
Lot 33 – Not started yet. **Needs construction entrance and silt fence**
Lot 43 – Digging out basement. **Needs construction entrance and silt fence**
Lot 91 – **construction entrance needs stone**; silt fence OK
Lot 93 – silt fence –OK; **Construction entrance needs stone.**
Lot 94 – silt fence OK
Lot 95 – **Tack up silt fence**
Lot 96 – **Tack up silt fence ; construction entrance needs stone.**

Verbal notification given to: Spoke with Mr. Rosenburger on site – They will clean up Lots 17 & 18 today.

Completion deadlines: **9/17/04**

Report prepared by: _____
Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
George Rosenberger, K. Hovnanian

From the desk of...
Debbie Switzer
E&S Control Specialist
Jenn Marshall SWCD
98 Alexandra Pike, Suite 31
Warrenton, VA 20186

(540) 347-3120 ext 3
Fax: (540) 349-0878

Lot 68 – No work started yet.
Lot 23 – Construction entrance OK; silt fence OK
Lot 24 – Construction entrance OK; silt fence OK
Lot 25 – Construction entrance – OK; Silt fence OK
Lot 26 – silt fence OK - **Can have only one construction entrance – close off one opening with silt fence.**
Lot 71 – Silt fence OK – Construction entrance - OK

Miller & Smith Homes

Lot 7 – complete – Return to County
Lot 8 – complete – Return to County
Lot 9 - **Construction entrance needs more stone;** silt fence - OK
Lot 10 –**Needs stone for construction entrance- REPEAT.** Silt fence OK
Lot 74 – complete – Return to County
Lot 75 – **Tack up silt fence** / construction entrance- OK
Lot 76 – silt fence – OK/ construction entrance - OK

Verbal notification given to:

Completion deadlines: 9/17/04

Report prepared by: _____
Debbie Switzer

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
Tom Cummings, Engle Homes
Nelson Green, Miller & Smith Homes
Calvin Hardin (e-mail)

From the desk of...
Debbie Switzer
E&S Control Specialist
John Marshall SWCD
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 8/11/04

Time: 12:10 PM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
		See below		8/20/04

COMMENTS: Overall the site looks pretty good. See notes below.

Individual Lots (K. Hovnanian) –

Lot 2 – Silt fence – OK / Construction Entrance - OK
Lot 5 – paved and sodded – Return to County
Lot 8 – Complete - RTC
Lot 9 – **seed and mulch or put up silt fence**
Lot 12 – construction entrance OK; silt fence OK
Lot 13 – **construction entrance needs stone**; silt fence OK
Lot 14 - Construction entrance OK; silt fence OK
Lot 15 – paved and sodded.
Repair the drop inlet protection behind this lot
Lot 16 – **Needs construction entrance**; silt fence OK.
Lot 17 - **Clean up construction entrance; tack up silt fence.**
Lot 18 – **Clean up construction entrance**; silt fence OK
Lot 19 – Construction entrance OK
Lot 20 – Construction entrance OK
Lot 21 - **Needs silt fence in front.**
Lot 22 – **Needs silt fence in front**
Lot 24 – **Clean up road in front**
Lot 25 – **Tack up silt fence**
Lot 91 - construction entrance – OK; silt fence OK
Lot 93 – **tack up silt fence**
Lot 94 – **Tack silt fence up.**
Lot 95 – **Tack up silt fence**
Lot 96 - Silt fence –OK; construction entrance OK
Lot 97 – Return to county
Lot 98 – Return to county
Lot 99 – **Needs silt fence at lower end or sod**

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 7/26/04

Time: 10:15 AM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Shugart Court is looking much better. Construction entrances are in and the road is cleaner.

The following violations need to be corrected:

- There are several repeat violations noted below. Stop work orders will be issued next time if the problems are not addressed.
- Maintain / replace curb and gutter inlet protections throughout site.

Individual Lots (K. Hovnanian) – All entrances used by construction traffic **MUST** have a stone construction entrance

Lot 2 – clean up around construction entrance and repair silt fence.

Lot 5 – repair silt fence on site (REPEAT)

Lot 8 – Complete - RTC

Lot 9 – Needs silt fence (REPEAT)

Lot 10 – Complete - RTC

Lot 11 – Complete - RTC

Lot 14 – repair construction entrance – Needs more stone– clean up mud on road (REPEAT!) There is a crew on site installing silt fence and the stone is on the way.

Lot 15 – repair silt fence, (REPEAT)

Lot 16 – Needs silt fence and construction entrance.

Lot 17 - Needs a construction entrance – add stone and silt fence **(REPEAT)**

Lot 19 – Need to clean road in front and replace curb & gutter inlet protection.

Lot 21 - add stone on construction entrance **(REPEAT)**

Lot 22 – add stone to entrance (REPEAT)

Lot 23 – Complete - RTC

Lot 24 – Construction entrance – OK; repair silt fence

Lot 25 – Maintain silt fence

Lot 91 - construction entrance – OK; maintain silt fence

Lot 93 – silt fence – OK

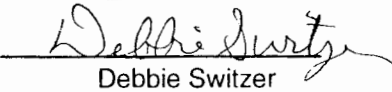
Lot 94 – Tack silt fence up.

Lot 95 -

Lot 96 - Silt fence –OK; construction entrance OK

Verbal notification given to: Spoke with Mr. Rosenburger on site. Crews are on site putting up silt fence and stone for construction entrances have been ordered.

Completion deadlines: 8/2/04

Report prepared by: 
Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
George Rosenberger, K. Hovnanian

From the desk of...
Debbie Switzer
E&S Control Specialist
John Marshall SWCD
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: 7/1/04

Time: 12:10 PM

Inspected by: Debbie Switzer

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☐ Temporary Stabilization Finish Grading
Clearing and Grubbing ☒ Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline
				7/12/04

COMMENTS: All of the roads in this section are extremely messy. There is heavy tracking from the stock pile between lots 41 & 42.

The following violations need to be corrected:

1. **MS-17** – Shugart Court is still extremely messy. **(K. Hovnanian) REPEAT**
 - Roads need to be scraped/swept
 - All silt fence needs to be repaired/re-installed
 - Construction entrances need to be fixed up.
 - Add a construction entrance to the stock pile.

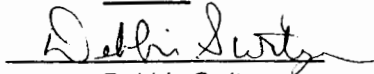
Individual Lots (K. Hovnanian) – All entrances used by construction traffic **MUST** have a stone construction entrance

Lot 2 – entrance and silt fence OK
Lot 4 – Return to County
Lot 5 – entrance OK, repair silt fence on site (REPEAT)
Lot 6 – lot sodded- Return to County
Lot 7 – lot sodded- Return to County
Lot 8 – Needs silt fence
Lot 9 – Needs silt fence
Lot 10 – entrance and silt fence OK
Lot 11 – entrance and silt fence OK
Lot 14 – repair construction entrance – clean up mud on road (REPEAT)
Lot 15 – repair silt fence, (REPEAT)
Lot 16 – They are getting to pave entrance
Lot 17 - Needs a construction entrance – add stone and silt fence
Lot 19 – install silt fence and clean up construction entrance
Lot 21 - add stone on construction entrance
Lot 22 – add stone to entrance (REPEAT)
Lot 23 – entrance and silt fence OK
Lot 24 – add #3 stone to entrance – used by traffic – clean up mud off roads, Tack up silt fence REPEAT
Lot 26 – Return to County
Lot 91 - Needs construction entrance, tack up silt fence
Lot 96 - Needs construction entrance
Lot 97 - Return to County

Verbal notification given to:

Completion deadlines: 7/12/04

Report prepared by:


Debbie Switzer

Written notification given to: Vint Hill EDA
Dave Simons, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
George Rosenberger, K. Hovnanian

From the desk of...
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E&S Control Specialist
John Marshall SWCD
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Warrenton, VA 20186

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Fax: (540) 349-0878

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: **4/1/04**

Time: **2:00 PM**

Inspected by:

Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
Clearing and Grubbing ☒ Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Rain today. Stone has been laid on remainder of roads. Inlet protections look good.

The following violations need to be corrected:

1. **MS-10** – Install inlet protection on the new curb inlets.
2. **MS-1** – Seed and mulch disturbed areas behind curbs now that they have been backfilled.

Individual Lots (K. Hovnanian)

Lot 2 – entrance and silt fence OK

Lot 3 – entrance and silt fence OK

Lot 4 – silt fence OK, add #3s to entrance

Lot 5 – silt fence OK, add #3s to entrance

Lot 6 – entrance and silt fence OK

Lot 7 – install silt fence along front and back of lot (REPEAT VIOLATION), entrance OK

Lot 23 – foundation in place, install construction entrance and silt fence

Lot 26 – foundation in place, install construction entrance and silt fence

Lot 97 – reinstall silt fence or sod lot

Lot 98 – install silt fence along front

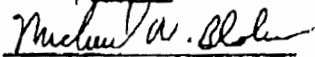
Lot 99 – entrance and silt fence OK

Verbal notification given to:

Completion deadlines:

4/15/04

Report prepared by:



Mike Blake

Written notification given to:

Vint Hill EDA
Dave Simons, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
George Rosenberger, K. Hovnanian

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
98 Alexandria Pike, Suite 31
Warrenton, VA 20186

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Fax: (540) 349-0878

EROSION & SEDIMENT CONTROL**INSPECTION REPORT**Project Name: **VINT HILL LANDBAY "G"**

File No.

Inspection Date: **4/1/04**Time: **2:00 PM**

Inspected by:

Mike Blake**STAGE OF CONSTRUCTION**

Pre-construction Conference

Flough Grading/Utilities

☒

Temporary Stabilization

Finish Grading

Clearing and Grubbing

☒

Road Prep/Paving

☒

Building Construction

Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Rain today. Stone has been laid on remainder of roads. Inlet protections look good.**The following violations need to be corrected:**

1. **MS-10** – Install inlet protection on the new curb inlets.
2. **MS-1** – Seed and mulch disturbed areas behind curbs now that they have been backfilled.

Individual Lots (K. Hovnanian)

Lot 2 – entrance and silt fence OK

Lot 3 – entrance and silt fence OK

Lot 4 – silt fence OK, add #3s to entranceLot 5 – silt fence OK, add #3s to entrance

Lot 6 – entrance and silt fence OK

Lot 7 – install silt fence along front and back of lot (REPEAT VIOLATION), entrance OKLot 23 – foundation in place, install construction entrance and silt fenceLot 26 – foundation in place, install construction entrance and silt fenceLot 97 – reinstall silt fence or sod lotLot 98 – install silt fence along front

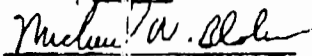
Lot 99 – entrance and silt fence OK

Verbal notification given to:

Completion deadlines:

4/15/04

Report prepared by:



Mike Blake

Written notification given to: Vint Hill EDA

Dave Simons, Miller & Smith

Bulch Crouch, William A. Hazel, Inc.

George Rosenberger, K. Hovnanian

From the desk of...

Mike Blake

E&S Program Manager

John Marshall SWCD

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Warrenton, VA 20186

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Fax: (540) 349-0878

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 3/18/04Time: 11:00 AM

Inspected by: _____

Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
 Clearing and Grubbing ☒ Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Seeding and mulching of the majority of the disturbed areas has been completed and looks good. With the exception of the areas draining to sediment basin #1, most areas on site have been seeded and mulched. Flushing of waterlines underway on site. Need to keep Mauchley Court and Osborne Drive clean. Keep inlet protections cleaned out.

The following violations need to be corrected:

1. MS-17 – Add stone to construction entrance onto Osborne Court.

The following violations have been corrected:

2. MS-11 – Silt fence has been installed around storm sewer outfall structure <38>.
3. MS-4 – Silt fence below lots 71 & 72 is in place and holding well.

Individual Lots (K. Hovnanian)

Lot 3 – entrance and silt fence OK

Lot 4 – entrance and silt fence OK

Lot 5 – install silt fence in front, block off entrance with silt fence or install construction entranceLot 6 – install silt fence along front of lot, add stone to construction entranceLot 7 – install silt fence along front and back of lot, install construction entrance with #3 stone

Lot 97 – entrance and silt fence OK

Lot 99 – entrance and silt fence OK

Verbal notification given to: Kevin FrielCompletion deadlines: 3/31/04

Report prepared by: _____

Mike Blake

Written notification given to: Vint Hill EDA
 Kevin Friel, Miller & Smith
 Butch Crouch, William A. Hazel, Inc.
 George Rosenberger, K. Hovnanian

From the desk of...
 Mike Blake
 E&S Program Manager
 John Marshall SWCD
 98 Alexandria Pike, Suite 31
 Warrenton, VA 20186

(540) 347-3120
 Fax: (540) 349-0878

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 2/25/04Time: 2:30 PMInspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
 Clearing and Grubbing ☒ Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Sediment basin #2 was removed – channel constructed. Super silt fence and rock check dam in place.

The following violations need to be corrected:

- MS-11** – Install rip rap outlet protection at storm sewer outfall structure <38> into stream channel. Install silt fence, per approved plan, around culvert outlet. Seed and mulch all disturbed areas leading into channel. **(REPEAT VIOLATION)**
 - 2/25** – Rip rap outlet protection has been installed, however silt fence has not been installed and the areas have not been seeded and mulched.
- MS-17** – Add stone to construction entrance onto Osborne Court.
- MS-4** – Sediment traps on lots 71 & 72 have been removed. Make sure all silt fence is up and in good condition.
- MS-17** – Pumping underway out of sediment trap on lot 54. **ALL PUMPING MUST USE A SILT BAG TO FILTER THE WATER.** Any future violations may result in a Stop Work Order on the project.

The following violations have been corrected:

- MS-11** – Rip rap has been placed along channel to pumpstation.
- MS-11** – Rip rap outlet protection has been installed at storm sewer outfall into sediment basin #1.

Individual Lots (K. Hovnanian)

Lot 3 – reinstall silt fence, install construction entrance with #3 stoneLot 6 – install silt fence along front and back of lot, install construction entrance with #3 stoneLot 7 – install silt fence along front and back of lot, install construction entrance with #3 stone

Lot 97 – maintain silt fence and entrance

Lot 99 – maintain silt fence and entrance

Verbal notification given to: Kevin Friel, George RosenbergerCompletion deadlines: 3/10/04Report prepared by: Michael A. Blake

Mike Blake

Written notification given to: Vint Hill EDA

Kevin Friel, Miller & Smith

Butch Crouch, William A. Hazel, Inc.

George Rosenberger, K. Hovnanian

From the desk of...
 Mike Blake
 E&S Program Manager
 John Marshall SWCD
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 Warrenton, VA 20186

(540) 347-3120
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John Marshall SWCD
98 Alexandria Pike, Suite 31
Warrenton, VA 20186
(540) 347-3120
(540) 349-0878 (fax)
E-mail address: michael-blake@va.nacdnet.org

Fax

To: Kevin Friel

From: Mike Blake

Fax:
347-7905

Date: 2/3/04

Phone:

Pages: 5 (including cover)

Re: E&S Reports

Cc:

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Kevin

Here are my reports from yesterday. The soil stabilization matting issues can be put on hold until the weather allows for installation.

If you have any questions, let me know.

Thanks

Mike

EROSION & SEDIMENT CONTROL**INSPECTION REPORT**Project Name: **VINT HILL LANDBAY "G"**

File No. _____

Inspection Date: 2/2/04Time: 11:30 AM

Inspected by: _____

Mike Blake**STAGE OF CONSTRUCTION**

Pre-construction Conference Rough Grading/Utilities ☒ Temporary Stabilization Finish Grading
 Clearing and Grubbing ☒ Road Prep/Paving ☒ Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Site snow covered. Work underway on sanitary sewer lines Averbach Court.**The following violations need to be corrected:**

- MS-11** – Channel to pumpstation has been constructed. However soil stabilization matting is required in the bottom of the channel since the existing rip rap is no longer being used. **(REPEAT VIOLATION)**
 - 2/2 – Silt fence has been repaired. Rip rap still needs to be placed in channel.
- MS-11** – Install rip rap outlet protection at storm sewer outfall into sediment basin #1. **(REPEAT VIOLATION)**
 - 2/2 – Not yet completed.
- MS-11** – Install rip rap outlet protection at storm sewer outfall structure <38> into stream channel. Install silt fence, per approved plan, around culvert outlet. Seed and mulch all disturbed areas leading into channel. **(REPEAT VIOLATION)**
 - 2/2 – Not yet completed.
- MS-4** – Install/repair silt fence below lot 72.
- MS-17** – Maintain construction entrance onto Osborne Court. Muddy from vehicular traffic.

The following violations need to be corrected:

- MS-1** – The following areas have been seeded and mulched:
 - Lots 12-26
 - Lots 91-94

Individual Lots (K. Hovnanian)

Lot 3 – inactive

Lot 4 – inactive

Lot 97 – add VDOT #3 stone to construction entrance, repair silt fence

Lot 99 – add VDOT #3 stone to construction entrance, repair silt fence

Verbal notification given to: Faxed to Kevin FrielCompletion deadlines: **PASSED**Report prepared by: Michael W. Blake

Mike Blake

Written notification given to: Vint Hill EDA
 Kevin Friel, Miller & Smith
 Butch Crouch, William A. Hazel, Inc.
 George Rosenberger, K. Hovnanian

From the desk of...
 Mike Blake
 E&S Program Manager
 John Marshall SWCD
 98 Alexandria Pike, Suite 31
 Warrenton, VA 20188

(540) 347-3120
 Fax: (540) 349-0878

Lot 67 – install silt fence along road and lot 68, install construction entrance
Lot 70 – maintain construction entrances and silt fence
Lot 72 – maintain construction entrances and silt fence
Lot 73 – foundation in place, maintain silt fence and construction entrance

Verbal notification given to: Junior, Faxed to Kevin Friel

Completion deadlines: **PASSED**

Report prepared by:



Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.
Tom Cummings, Engle Homes

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
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**John Marshall
Soil & Water Conservation
District**
Commonwealth of Virginia



98 Alexandria Pike, Suite 31, Warrenton, VA 20186-2849
(540) 347-3120

January 5, 2004

Kevin Friel
Miller & Smith
P.O. Box 861456
Warrenton, VA 20187-1456

Re: Vint Hill, Landbay's "G" and "H"

Dear Mr. Friel:

The most recent Erosion and Sediment Control Inspection of the property (report attached) reveals the previously recorded problems have not been corrected. Violations of the *Virginia Erosion and Sediment Control Law* cited on the last inspection report, dated 11/24/03, and new violations identified in the 12/30/03 report, include the following:

Landbay "G"

- **Minimum Standard 1 states that permanent soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 30 days. Several areas identified on the attached report must be stabilized.**
- **Minimum Standard 11 states that before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel. Outlet protection and soil stabilization matting must be installed as outlined in the attached inspection report.**

Landbay "H"

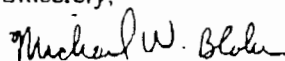
- **Minimum Standard 1 states that permanent soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 30 days. Several areas identified on the attached report must be stabilized.**



- **Minimum Standard 4 states that "sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment shall be constructed as a first step in any land disturbing activity and shall be made functional before upslope land disturbance takes place."** Silt fence and diversion dikes need to be fixed according to the attached inspection report.
- **Minimum Standard 10 states that all storm sewer inlets that are made operational during construction must be protected.** Clean out and repair all culvert and storm drain inlet protections.
- **Minimum Standard 11 states that before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.** Rip rap and soil stabilization matting must be installed as outlined in the attached inspection report.
- **Minimum Standard 15 states that "the bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed."** Install soil stabilization matting as outlined in the attached inspection report.

Please consider this a **Notice of Violation**. Failure to meet the requirements of the above Minimum Standards by 1/19/04 may result in a **Stop Work Order**. If you have any questions regarding this notice, or require assistance in meeting these specifications, please call.

Sincerely,



Mike Blake
E&S Program Manager

Cc: Christer Carshult, Office of Community Development
Laura Edmonds, Office of Community Development

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 12/30/03Time: 10:30 AMInspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference
☒ Clearing and Grubbing

☒ Rough Grading
 Building Construction

Finish Grading
 Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Second round of paving has occurred up to the end of Phase 1 (lots 91 and 26). Construction entrance placed at the end of Osborne Drive. Basin #1 appears to have been pumped down for storm sewer construction. More rip rap has been placed at the SWM Pond #6 outfall channel at the request of the neighboring landowner.

The following violations need to be corrected:

- MS-11** – Channel to pumpstation has been constructed. However soil stabilization matting is required in the bottom of the channel since the existing rip rap is no longer being used. **(REPEAT VIOLATION)**
 - 12/30** – More disturbance has occurred along this channel due to recent rip rap placement. All disturbed areas must be seeded and mulched. Silt fence at edge of disturbance on "G" has been run over and needs to be re-installed.
- MS-1** – All areas that will remain dormant for longer than 30 days must be stabilized with temporary seed and mulch. The following areas appear to meet this criteria and must be seeded and mulched:
 - Lots 12-26
 - Lots 91-94
- MS-11** – Install rip rap outlet protection at storm sewer outfall into sediment basin #1.
- MS-11** – Install rip rap outlet protection at storm sewer outfall structure <38> into stream channel. Install silt fence, per approved plan, around culvert outlet. Seed and mulch all disturbed areas leading into channel.

Individual Lots (K. Hovnanian)

Lot 3 – install silt fence and construction entrance

Lot 4 – install silt fence and construction entrance

Lot 97 – foundation in place, repair silt fence, install construction entrance

Lot 99 – foundation in place, repair silt fence, install construction entrance

Verbal notification given to: Faxed to Kevin FrielCompletion deadlines: PASSEDReport prepared by: Michael W. Blake

Mike Blake

Written notification given to: Vint Hill EDA
 Kevin Friel, Miller & Smith
 Butch Crouch, William A. Hazel, Inc.
 George Rosenberger, K. Hovnanian

From the desk of...
 Mike Blake
 E&S Program Manager
 John Marshall SWCD
 98 Alexandria Pike, Suite 31
 Warrenton, VA 20186

(540) 347-3120
 Fax: (540) 349-0878

EROSION & SEDIMENT CONTROL**INSPECTION REPORT**Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 11/24/03Time: 1:30 PMInspected by: Mike Blake**STAGE OF CONSTRUCTION**

Pre-construction Conference

☒ Rough Grading

Finish Grading

☒ Clearing and Grubbing

Building Construction

Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: All lots that are at final grade need to be seeded and mulched as soon as possible. Storm sewer being constructed along Sutherland Court.

The following violations need to be corrected:

1. **MS-11** – Channel to pumpstation has been constructed and all disturbed areas seeded and mulched. However soil stabilization matting is required in the bottom of the channel since the existing rip rap is no longer being used.

The following violations have been corrected:

2. **MS-1** – Waterline crossing to Landbay "F" has been seeded and mulched. Grass starting to come up.
3. **MS-4** – Silt fence below sediment trap #4 has been repaired.
4. **MS-10** – Curb and drop inlet protections have been cleaned out.

"The growing season is quickly coming to an end. Therefore it is CRITICAL that all disturbed areas that can be seeded and mulched are done so immediately."

Verbal notification given to: Faxed to Kevin FrielCompletion deadlines: **PASSED**

Report prepared by:

Michael P. W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
98 Alexandria Pike, Suite 31
Warrenton, VA 20186

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 10/30/03 Time: 10:30 AM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference ☐ Rough Grading Finish Grading
☒ Clearing and Grubbing Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Some of the items from the Notice of Violation dated 10/17/03 have been addressed, however not all of the violations have been corrected. To avoid a **STOP WORK ORDER** on this project, the following violations must be addressed immediately.

Lots 1-4, 9-11 and 97-100 have been seeded and mulched. Areas along Cray Drive have also been seeded and mulched. Looks very good.

The following violations need to be corrected:

- MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched and stabilized with rip rap (as shown on the plan). **(REPEAT VIOLATION)**
 - 10/30** – Topsoil currently being deposited on easement. Channel is being constructed. Complete work and stabilize with seed, mulch and rip rap in channel.
- MS-1** – Waterline crossing to Landbay "F" complete. Seed and mulch all disturbed areas immediately. **(REPEAT VIOLATION)**
 - 10/30** – In discussions with Junior on October 21st, he indicated that a gas line still had to be constructed through this easement. I told him that if this was the case, then they would need to install silt fence on both sides of the stream crossing. Silt fence not yet installed. **Install silt fence or seed and mulch all disturbed areas.**
- MS-4** – Repair silt fence below sediment trap #4. **(REPEAT VIOLATION)**
 - 10/30** – Silt fence still in disrepair.
- MS-10** – Clean out all curb and drop inlet protections.

The following violations have been corrected:

- MS-17** – Construction entrances will be installed at the end of the pavement after the next sections are paved.
- MS-1** – All disturbed areas along Cray Drive and Rogues Road have been seeded and mulched.

*****The growing season is quickly coming to an end. Therefore it is CRITICAL that all disturbed areas that can be seeded and mulched are done so immediately. *****

Verbal notification given to: Faxed to Kevin Friel

Completion deadlines: **PASSED**

Report prepared by: Michael W. Blake
Mike Blake

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
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EROSION & SEDIMENT CONTROL**INSPECTION REPORT**Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 10/30/03Time: 10:30 AMInspected by: Mike Blake**STAGE OF CONSTRUCTION**

Pre-construction Conference

☒ Rough Grading

Finish Grading

☒ Clearing and Grubbing

Building Construction

Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Some of the items from the Notice of Violation dated 10/17/03 have been addressed, however not all of the violations have been corrected. To avoid a **STOP WORK ORDER** on this project, the following violations must be addressed immediately.

Lots 1-4, 9-11 and 97-100 have been seeded and mulched. Areas along Cray Drive have also been seeded and mulched. Looks very good.

The following violations need to be corrected:

1. **MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched and stabilized with rip rap (as shown on the plan). **(REPEAT VIOLATION)**
 - **10/30** – Topsoil currently being deposited on easement. Channel is being constructed. Complete work and stabilize with seed, mulch and rip rap in channel.
2. **MS-1** – Waterline crossing to Landbay "F" complete. Seed and mulch all disturbed areas immediately. **(REPEAT VIOLATION)**
 - **10/30** – In discussions with Junior on October 21st, he indicated that a gas line still had to be constructed through this easement. I told him that if this was the case, then they would need to install silt fence on both sides of the stream crossing. Silt fence not yet installed. **Install silt fence or seed and mulch all disturbed areas.**
3. **MS-4** – Repair silt fence below sediment trap #4. **(REPEAT VIOLATION)**
 - **10/30** – Silt fence still in disrepair.
4. **MS-10** – Clean out all curb and drop inlet protections.

The following violations have been corrected:

5. **MS-17** – Construction entrances will be installed at the end of the pavement after the next sections are paved.
6. **MS-1** – All disturbed areas along Cray Drive and Rogues Road have been seeded and mulched.

"The growing season is quickly coming to an end. Therefore it is CRITICAL that all disturbed areas that can be seeded and mulched are done so immediately. "

Verbal notification given to: Faxed to Kevin FrielCompletion deadlines: **PASSED**Report prepared by: Michael W. Blake

Mike Blake

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
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John Marshall
Soil & Water Conservation
District
Commonwealth of Virginia



98 Alexandria Pike, Suite 31, Warrenton, VA 20186-2849
(540) 347-3120

October 17, 2003

Kevin Friel
Miller & Smith
P.O. Box 861456
Warrenton, VA 20187-1456

Re: Vint Hill, Landbay's "G" and "H"

Dear Mr. Friel:

The most recent Erosion and Sediment Control Inspection (10/17/03) of the property reveals the previously recorded problems requiring corrective action remained unchanged. Violations of the *Virginia Erosion and Sediment Control Law* cited on the last inspection report, dated 9/17/03, include the following:

Landbay "G"

- **Minimum Standard 1 states that permanent soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 30 days.** Several areas identified on the attached report should have already been stabilized. These areas must be stabilized immediately due to the end of the growing season.
- **Minimum Standard 17 states that "where construction vehicle access routes intersect paved or public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface."** Construction entrances must be installed at the end of all paved surfaces.

Landbay "H"

- **Minimum Standard 1 states that permanent soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 30 days.** Several areas identified on the attached report should have already been stabilized. These areas must be stabilized immediately due to the end of the growing season.



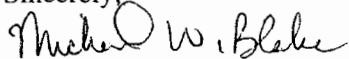
- **Minimum Standard 6 states that sediment traps and basins shall be designed and constructed based upon drainage area served by the trap.** Sediment basin #1 has been driven over and disturbed. Reconstruct emergency spillway to appropriate dimensions, and seed and mulch all disturbed areas behind the basin and diversion dikes.

- **Minimum Standard 11 states that before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.** Rip rap is needed at the natural stream channel outfall just above the current rip rap at storm structure <58>. The stream channel will downcut into the embankment if rip rap is not placed.

- **Minimum Standard 17 states that “where construction vehicle access routes intersect paved or public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface.”** Construction entrances must be installed at the end of all paved surfaces.

Please consider this a **Notice to Comply**. Failure to meet the requirements of the above Minimum Standards by 10/24/03 may result in a **Stop Work Order**. To avoid future Notices, all violations on the attached inspection reports must be corrected. If you have any questions regarding this notice, or require assistance in meeting these specifications, please call.

Sincerely,



Mike Blake
E&S Program Manager

Cc: Christer Carshult, Office of Community Development
Laura Edmonds, Office of Community Development

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 10/17/03 Time: 11:00 AM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference ☐ Rough Grading Finish Grading
☒ Clearing and Grubbing Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: A **Notice of Violation** letter has been issued for the repeat violations listed below. Sediment basins are holding up OK.

The following violations need to be corrected:

1. **MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched and stabilized with rip rap (as shown on the plan). **(REPEAT VIOLATION)**
2. **MS-17** – Install construction entrances at the end of all paved roads. **(REPEAT VIOLATION)**
3. **MS-1** – Waterline crossing to Landbay "F" complete. Seed and mulch all disturbed areas immediately.
4. **MS-4** – Repair silt fence below sediment trap #4.
5. **MS-1** – Seed and mulch all disturbed areas along Cray Drive and at the ingress/egress to Rogues Road.

*****The growing season is quickly coming to an end. Therefore it is CRITICAL that all disturbed areas that can be seeded and mulched are done so immediately. *****

Verbal notification given to: Faxed to Kevin Friel

Completion deadlines: October 24, 2003

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
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E&S Program Manager
John Marshall SWCD
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Warrenton, VA 20186

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ERUSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 9/17/03 Time: 3:00 PM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference
☒ Clearing and Grubbing

☒ Rough Grading
Building Construction

Finish Grading
Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: The contractor has done extensive work to bring the site into compliance. Overall, the site is in good shape now with a few things remaining to be done.

The following violations need to be corrected:

1. **MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched and stabilized with rip rap (as shown on the plan). **(REPEAT VIOLATION)**
2. **MS-17** – Install construction entrances at the end of all paved roads.

The following violations have been corrected:

3. **MS-11** – Rip rap outlet protection installed at the barrel on sediment basin #1.
 - 9/17 – Not field checked, but Junior indicated that this has been completed.
4. **MS-6** – Sediment basin #2 is being reconstructed. A new barrel has been installed and the dam embankment is being reconstructed. Site has been prepped to drain to the basin.
5. **MS-6** – Sediment trap #3 has been cleaned out.
6. **MS-6** – Most of the stockpiled material has been removed from sediment basin #1.
7. **MS-4** – Silt fence has been installed along access road behind lot 62.
8. **MS-4** – Silt fence has been installed behind lots 96-100, as shown on E&S plan.
9. **MS-10** – Silt fence inlet protection at structures <5> and <7> has been repaired.

Verbal notification given to: Junior, Kevin Friel

Completion deadlines:

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
98 Alexandria Pike, Suite 31
Warrenton, VA 20186

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 9/15/03 Time: 11:45 AM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference ☒ Rough Grading Finish Grading
☒ Clearing and Grubbing Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: No changes to site since 8/27/03 inspection. Portions of Cray Drive and Osborne Drive and all of Mauchley Court have been paved.

The following violations need to be corrected:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. **(REPEAT VIOLATION)**
 - 9/15 – No change, rip rap still needed
- MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched and stabilized with rip rap (as shown on the plan). **(REPEAT VIOLATION)**
- MS-6** – Sediment basin #2 is no longer functional. **(REPEAT VIOLATION)**
 - Restore basin volume capacity by removing soil to the left of the riser
 - Restore embankment height, requiring all runoff to leave through the principal spillway (riser)
 - Make sure barrel outlet is not blocked, allowing runoff to exit site
 - Repair silt fence at barrel outlet
 - Reconstruct diversion dikes so that all upslope drainage reaches the sediment basin. This may require the movement/alteration of the stockpiles on either side of the basin.
- MS-6** – Sediment trap #3 needs to be cleaned out. Restore wet storage (below rock weir) to 1.5' depth. **(REPEAT VIOLATION)**
- MS-17** – Install construction entrances at the end of all paved roads.
- MS-6** – Remove stockpiled material out of sediment basin #1 to restore volume of basin.
- MS-4** – Install silt fence along access road behind lot 62 to capture all sediment bypassing perimeter E&S controls (shown on E&S plan).
- MS-4** – Install silt fence behind lots 96-100, as shown on E&S plan.
- MS-10** – Repair silt fence inlet protection at structures <5> and <7>.

The following violations have been corrected:

- MS-4** – A sediment trap has been installed below sanitary sewer work east of existing SWM pond.

Verbal notification given to: Junior, faxed to Kevin Friel

Completion deadlines: **PASSED**

Report prepared by: Michael W. Blake
Mike Blake

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
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John Marshall SWCD
98 Alexandria Pike, Suite 31
Warrenton, VA 20186
(540) 347-3120
(540) 349-0878 (fax)
E-mail address: michael-blake@va.nacdnet.org

Fax

To: Kevin Friel **From:** Mike Blake

Fax: 347-7905 **Date:** 9/16/03

Phone: **Pages:** 4 (including cover)

Re: Vint Hill **Cc:**

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Kevin

Here are my inspection reports from yesterday. I spoke with Junior yesterday in the field about these repeat violations. We need to make sure these things are taken care quickly. I'm not issuing a Notice of Violation letter with the understanding that these violations will be corrected.

If you have any questions, let me know.

Thanks

Mike

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 9/15/03Time: 11:45 AMInspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference
☒ Clearing and Grubbing

☒ Rough Grading
 Building Construction

Finish Grading
 Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: No changes to site since 8/27/03 inspection. Portions of Cray Drive and Osborne Drive and all of Mauchley Court have been paved.

The following violations need to be corrected:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. **(REPEAT VIOLATION)**
 - 9/15 – No change, rip rap still needed
- MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched and stabilized with rip rap (as shown on the plan). **(REPEAT VIOLATION)**
- MS-6** – Sediment basin #2 is no longer functional. **(REPEAT VIOLATION)**
 - Restore basin volume capacity by removing soil to the left of the riser
 - Restore embankment height, requiring all runoff to leave through the principal spillway (riser)
 - Make sure barrel outlet is not blocked, allowing runoff to exit site
 - Repair silt fence at barrel outlet
 - Reconstruct diversion dikes so that all upslope drainage reaches the sediment basin. This may require the movement/alteration of the stockpiles on either side of the basin.
- MS-6** – Sediment trap #3 needs to be cleaned out. Restore wet storage (below rock weir) to 1.5' depth. **(REPEAT VIOLATION)**
- MS-17** – Install construction entrances at the end of all paved roads.
- MS-6** – Remove stockpiled material out of sediment basin #1 to restore volume of basin.
- MS-4** – Install silt fence along access road behind lot 62 to capture all sediment bypassing perimeter E&S controls (shown on E&S plan).
- MS-4** – Install silt fence behind lots 96-100, as shown on E&S plan.
- MS-10** – Repair silt fence inlet protection at structures <5> and <7>.

The following violations have been corrected:

- MS-4** – A sediment trap has been installed below sanitary sewer work east of existing SWM pond.

Verbal notification given to: Junior, faxed to Kevin FrielCompletion deadlines: **PASSED**Report prepared by: Michael W. Blake
Mike Blake

From the desk of...
 Mike Blake
 E&S Program Manager
 John Marshall SWCD
 98 Alexandria Pike, Suite 31
 Warrenton, VA 20186

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ERUSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 8/27/03 Time: 10:45 AM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference
☒ Clearing and Grubbing

☒ Rough Grading
Building Construction

Finish Grading
Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Curb is being poured along portions of Cray Drive and Osborne Drive.

The following violations need to be corrected:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. **(REPEAT VIOLATION)**
 - 8/27** – No change, rip rap still needed
- MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched.
- MS-6** – Sediment basin #2 is no longer functional.
 - Restore basin volume capacity by removing soil to the left of the riser
 - Restore embankment height, requiring all runoff to leave through the principal spillway (riser)
 - Make sure barrel outlet is not blocked, allowing runoff to exit site
 - Repair silt fence at barrel outlet
- MS-6** – Sediment trap #3 needs to be cleaned out. Restore wet storage (below rock weir) to 1.5' depth.

The following violations have been corrected:

- MS-4** – A sediment trap has been installed below sanitary sewer work east of existing SWM pond.

Verbal notification given to: Junior, faxed to Kevin Friel

Completion deadlines: September 10, 2003

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
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E&S Program Manager
John Marshall SWCD
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Warrenton, VA 20186

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 8/27/03Time: 10:45 AMInspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference
☒ Clearing and Grubbing

☒ Rough Grading
 Building Construction

Finish Grading
 Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Curb is being poured along portions of Cray Drive and Osborne Drive.

The following violations need to be corrected:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. **(REPEAT VIOLATION)**
 - 8/27 – No change, rip rap still needed
- MS-1** – Sanitary sewer line has been constructed from pumpstation to Sutherland Court. All disturbed areas along sanitary line, particularly from sediment trap #4 to the pumpstation, must be seeded and mulched.
- MS-6** – Sediment basin #2 is no longer functional.
 - Restore basin volume capacity by removing soil to the left of the riser
 - Restore embankment height, requiring all runoff to leave through the principal spillway (riser)
 - Make sure barrel outlet is not blocked, allowing runoff to exit site
 - Repair silt fence at barrel outlet
- MS-6** – Sediment trap #3 needs to be cleaned out. Restore wet storage (below rock weir) to 1.5' depth.

The following violations have been corrected:

- MS-4** – A sediment trap has been installed below sanitary sewer work east of existing SWM pond.

Verbal notification given to: Junior, faxed to Kevin Friel

Completion deadlines: September 10, 2003

Report prepared by: Mike Blake

Mike Blake

Written notification given to: Vint Hill EDA
 Kevin Friel, Miller & Smith
 Butch Crouch, William A. Hazel, Inc.

From the desk of...
 Mike Blake
 E&S Program Manager
 John Marshall SWCD
 98 Alexandria Pike, Suite 31
 Warrenton, VA 20186

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 7/29/03

Time: 11:00 AM

Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference

☒ Rough Grading

☐ Finish Grading

☒ Clearing and Grubbing

☐ Building Construction

☐ Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Entire site not checked for compliance. Only the areas along the existing SWM pond and adjacent to Land Bay "H".

The following violations need to be corrected:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. **(REPEAT VIOLATION)**
 - 7/16** – Outlet channel constructed. Rock check dam built beside diversion dike and silt fence. Silt fence blown out – repair. VDOT #3 stone used as outlet protection has blown out – install rip rap.
 - 7/29** – Not field checked. Needs to be completed if not already done so.
- MS-4** – A sediment trap needs to be installed below sanitary sewer work east of existing SWM pond. This should be installed in the rip rap channel below disturbance. Once sanitary work is completed in this channel, it must be stabilized with rip rap, seed and mulch.
- MS-4** – Water currently being pumped out of sanitary line into stream. This is not a violation, however this is a **warning** that all pumping operations from the site **MUST** be filtered through a sediment trapping measure. The silt sac is the best measure to use. It appears that sediment trap #4 may have to be dewatered for sewer line construction. This protocol must be followed and the sediment trap must be reconstructed, seeded and mulched following sewer line construction.

The following violations have been corrected:

- MS-4** – Silt fence down beside sediment trap #4.
 - 7/29** – Silt fence repaired.
- MS-4** – Silt fence is needed on either side of the outfall channel behind sediment basin #2 to protect the channel from upslope sedimentation.
 - 7/29** – Silt fence installed.

Verbal notification given to: Kevin Friel

Completion deadlines: 8/12/03

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
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E&S Program Manager
John Marshall SWCD
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 7/16/03

Time: 2:30 PM

Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference

☒ Rough Grading

☐ Finish Grading

☒ Clearing and Grubbing

☐ Building Construction

☐ Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Heavy rain last week. Construction entrance looks OK. Sanitary sewer being laid around Mauchley Court.

The following items need to be completed:

1. **MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. (**REPEAT VIOLATION**)
 - **7/16** – Outlet channel constructed. Rock check dam built beside diversion dike and silt fence. Silt fence blown out – repair. VDOT #3 stone used as outlet protection has blown out – install rip rap.
2. **MS-4** – Silt fence down beside sediment trap #4. Repair.
3. **MS-4** – Silt fence is needed on either side of the outfall channel behind sediment basin #2 to protect the channel from upslope sedimentation.

The following violations have been corrected:

4. **MS-6** – Baffles have been installed in both basins. Baffle in sediment basin #2 was not installed according to field change.
5. **MS-6** – Sediment basin #2 has been increased.
6. **MS-4** – Tree protection to the left of the construction entrance and along Rt. 602 has been repaired.
7. **MS-6** – Sediment trap #6 appears to be functioning as designed.
8. **MS-4** – Rock check dam has been installed in existing channel along access road just above existing triple culvert leading into SWM pond.

Verbal notification given to: Kevin Friel

Completion deadlines: PASSED

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
Mike Blake
E&S Program Manager
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 7/16/03Time: 2:30 PM

Inspected by: _____

Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference

☒ Rough Grading

Finish Grading

☒ Clearing and Grubbing

Building Construction

Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Heavy rain last week. Construction entrance looks OK. Sanitary sewer being laid around Mauchley Court.

The following items need to be completed:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. **(REPEAT VIOLATION)**
 - 7/16** – Outlet channel constructed. Rock check dam built beside diversion dike and silt fence. Silt fence blown out – repair. VDOT #3 stone used as outlet protection has blown out – install rip rap.
- MS-4** – Silt fence down beside sediment trap #4. Repair.
- MS-4** – Silt fence is needed on either side of the outfall channel behind sediment basin #2 to protect the channel from upslope sedimentation.

The following violations have been corrected:

- MS-6** – Baffles have been installed in both basins. Baffle in sediment basin #2 was not installed according to field change.
- MS-6** – Sediment basin #2 has been increased.
- MS-4** – Tree protection to the left of the construction entrance and along Rt. 602 has been repaired.
- MS-6** – Sediment trap #6 appears to be functioning as designed.
- MS-4** – Rock check dam has been installed in existing channel along access road just above existing triple culvert leading into SWM pond.

Verbal notification given to: Kevin FrielCompletion deadlines: PASSEDReport prepared by: Michael W. Blake
Mike BlakeWritten notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

From the desk of...
Mike Blake
E&S Program Manager
John Marshall SWCD
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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 6/17/03

Time: 3:30 PM

Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference

☒ Rough Grading

☐ Finish Grading

☒ Clearing and Grubbing

☐ Building Construction

☐ Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Weather has been extremely wet. Roads are roughed in. Rain today. No one on site.

The following items need to be completed:

- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. Construct outlet channel as shown on the E&S plan, including rock check dam. Alter silt fence behind channel. Seed and mulch all disturbed areas in and around outlet channel. **(REPEAT VIOLATION)**
 - 6/17** – Still no rip rap outlet protection at barrel. Outlet channel has been constructed, seeded and mulched. Rock check dam should be placed in channel.
- MS-6** – Install baffles in both sediment basins. The placement of the baffle on sediment basin #2 has been altered in the field. When dewatering the basins to install the baffles, pump water into the neighboring sediment traps to filter the water. **(REPEAT VIOLATION)**
 - 6/17** – Baffles still not installed.
- MS-6** – Sediment basin #2 was moved and its dam embankment is the existing trail. Tied the riser into the existing culvert pipe. Increase capacity of basin to assure it is large enough to adequately handle the drainage area. **(REPEAT VIOLATION)**
 - 6/17** – Sediment basin still not enlarged to handle drainage area.
- MS-4** – Tree protection to the left of the construction entrance and along Rt. 602 has been driven through. Repair tree protection to protect tree save/buffer area.
- MS-6** – Sediment trap #6 does not appear to be filling up with runoff as designed. Check for leaks in outlet structure.
- MS-4** – Install rock check dam in existing channel along access road just above existing triple culvert leading into SWM pond. Sediment leaving site via channel into pond.

The following violations have been corrected:

- MS-5** – The diversion dikes and dam embankments have been compacted, shaped and seeded and mulched.
- MS-6** – The emergency spillway on sediment basin #1 has been constructed, seeded and mulched.
- MS-4** – Sediment trap at entrance is small, but in place. Grass coming up on embankment. May need to be enlarged at a future date.

Verbal notification given to: Faxed to Kevin Friel

Completion deadlines: **PASSED**

Report prepared by: Michael W. Blake

Mike Blake

EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 5/30/03 Time: 10:30 AM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference
☒ Clearing and Grubbing

☒ Rough Grading
Building Construction

Finish Grading
Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Weather has been extremely wet. Little progress has been made on site. Roads are roughed in.

The following items need to be completed:

- MS-5** – The diversion dikes and dam embankments have not been adequately compacted/constructed. All diversion dikes (with the exception of the dike leading into sediment basin #1 that has been seeded) need to be compacted. The dam embankments on sediment basin #1 and all sediment traps need to be compacted and dressed up. Seed and mulch all dikes and embankments following compaction. **(REPEAT VIOLATION)**
- MS-6** – Sediment basin #1 does not have an emergency spillway. Construct spillway as shown on the E&S plan. **(REPEAT VIOLATION)**
- MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. Construct outlet channel as shown on the E&S plan, including rock check dam. Alter silt fence behind channel. Seed and mulch all disturbed areas in and around outlet channel. **(REPEAT VIOLATION)**
- MS-6** – Install baffles in both sediment basins. The placement of the baffle on sediment basin #2 has been altered in the field. When dewatering the basins to install the baffles, pump water into the neighboring sediment traps to filter the water. **(REPEAT VIOLATION)**
- MS-4** – Install the sediment trap located beside the construction entrance. **(REPEAT VIOLATION)**
- MS-6** – Sediment basin #2 was moved and its dam embankment is the existing trail. Tied the riser into the existing culvert pipe. Increase capacity of basin to assure it is large enough to adequately handle the drainage area. **(REPEAT VIOLATION)**

The following observations were made:

- Silt fence has been installed behind sediment basin #1 where tree protection was incorrectly placed.

Verbal notification given to: Kevin Friel – Kevin said that they will make the corrections once the weather allows.

Completion deadlines: PASSED – Deadline extended due to weather

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"
Inspection Date: 5/15/03 Time: 11:30 AM

File No. _____
Inspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference ☐ Rough Grading Finish Grading
☒ Clearing and Grubbing Building Construction Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: E&S controls have been installed. Walked site with Kevin and Junior (William A. Hazel, Inc.).

The following items need to be completed:

1. **MS-5** – The diversion dikes and dam embankments have not been adequately compacted/constructed. All diversion dikes (with the exception of the dike leading into sediment basin #1 that has been seeded) need to be compacted. The dam embankments on sediment basin #1 and all sediment traps need to be compacted and dressed up. Seed and mulch all dikes and embankments following compaction.
2. **MS-6** – Sediment basin #1 does not have an emergency spillway. Construct spillway as shown on the E&S plan.
3. **MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. Construct outlet channel as shown on the E&S plan, including rock check dam. Alter silt fence behind channel. Seed and mulch all disturbed areas in and around outlet channel.
4. **MS-6** – Install baffles in both sediment basins. The placement of the baffle on sediment basin #2 has been altered in the field. When dewatering the basins to install the baffles, pump water into the neighboring sediment traps to filter the water.
5. **MS-4** – Install the sediment trap located beside the construction entrance.
6. **MS-6** – Sediment basin #2 was moved and its dam embankment is the existing trail. Tied the riser into the existing culvert pipe. Increase capacity of basin to assure it is large enough to adequately handle the drainage area.

The following observations were made:

7. It was agreed upon that sediment trap #1 does not have to be installed yet, due to activity on Landbay "H".
8. Sediment trap #4 was pushed back to the edge of the pond to capture further disturbance. Trap appears to be oversized and should handle any extra drainage area efficiently.

Verbal notification given to: Kevin Friel, Junior

Completion deadlines: 5/29/03

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

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ERUSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 5/15/03

Time: 11:30 AM

Inspected by: Mike Blake

STAGE OF CONSTRUCTION

☐ Pre-construction Conference

☒ Rough Grading

☐ Finish Grading

☒ Clearing and Grubbing

☐ Building Construction

☐ Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: E&S controls have been installed. Walked site with Kevin and Junior (William A. Hazel, Inc.).

The following items need to be completed:

1. **MS-5** – The diversion dikes and dam embankments have not been adequately compacted/constructed. All diversion dikes (with the exception of the dike leading into sediment basin #1 that has been seeded) need to be compacted. The dam embankments on sediment basin #1 and all sediment traps need to be compacted and dressed up. Seed and mulch all dikes and embankments following compaction.
2. **MS-6** – Sediment basin #1 does not have an emergency spillway. Construct spillway as shown on the E&S plan.
3. **MS-11** – Install rip rap outlet protection at the barrel on sediment basin #1. Construct outlet channel as shown on the E&S plan, including rock check dam. Alter silt fence behind channel. Seed and mulch all disturbed areas in and around outlet channel.
4. **MS-6** – Install baffles in both sediment basins. The placement of the baffle on sediment basin #2 has been altered in the field. When dewatering the basins to install the baffles, pump water into the neighboring sediment traps to filter the water.
5. **MS-4** – Install the sediment trap located beside the construction entrance.
6. **MS-6** – Sediment basin #2 was moved and its dam embankment is the existing trail. Tied the riser into the existing culvert pipe. Increase capacity of basin to assure it is large enough to adequately handle the drainage area.

The following observations were made:

7. It was agreed upon that sediment trap #1 does not have to be installed yet, due to activity on Landbay "H".
8. Sediment trap #4 was pushed back to the edge of the pond to capture further disturbance. Trap appears to be oversized and should handle any extra drainage area efficiently.

Verbal notification given to: Kevin Friel, Junior

Completion deadlines: 5/29/03

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Vint Hill EDA
Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

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EROSION & SEDIMENT CONTROL

INSPECTION REPORT

Project Name: VINT HILL LANDBAY "G"

File No. _____

Inspection Date: 4/22/03

Time: 2:00 PM

Inspected by: Mike Blake

STAGE OF CONSTRUCTION

Pre-construction Conference

Rough Grading

Finish Grading

☒ Clearing and Grubbing

Building Construction

Final Stabilization

*State Regulation (section)	<input type="checkbox"/> if repeat violation	Problem location & description	Corrective action required	Deadline

COMMENTS: Site is still in the process of being cleared. Burn piles still on site. E&S controls are roughed in on site. Tree protection and silt fence has been installed on site. Sediment basins, traps and diversion dikes have been roughly installed. Tree protection behind sediment basin #1 has been altered from the plan. Sediment trap #4 has been moved back, off the existing path. Kevin will look into both of these deviations from the plan. Construction entrance is in place and looks good.

Verbal notification given to: Kevin Friel

Completion deadlines: As indicated

Report prepared by: Michael W. Blake
Mike Blake

Written notification given to: Kevin Friel, Miller & Smith
Butch Crouch, William A. Hazel, Inc.

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